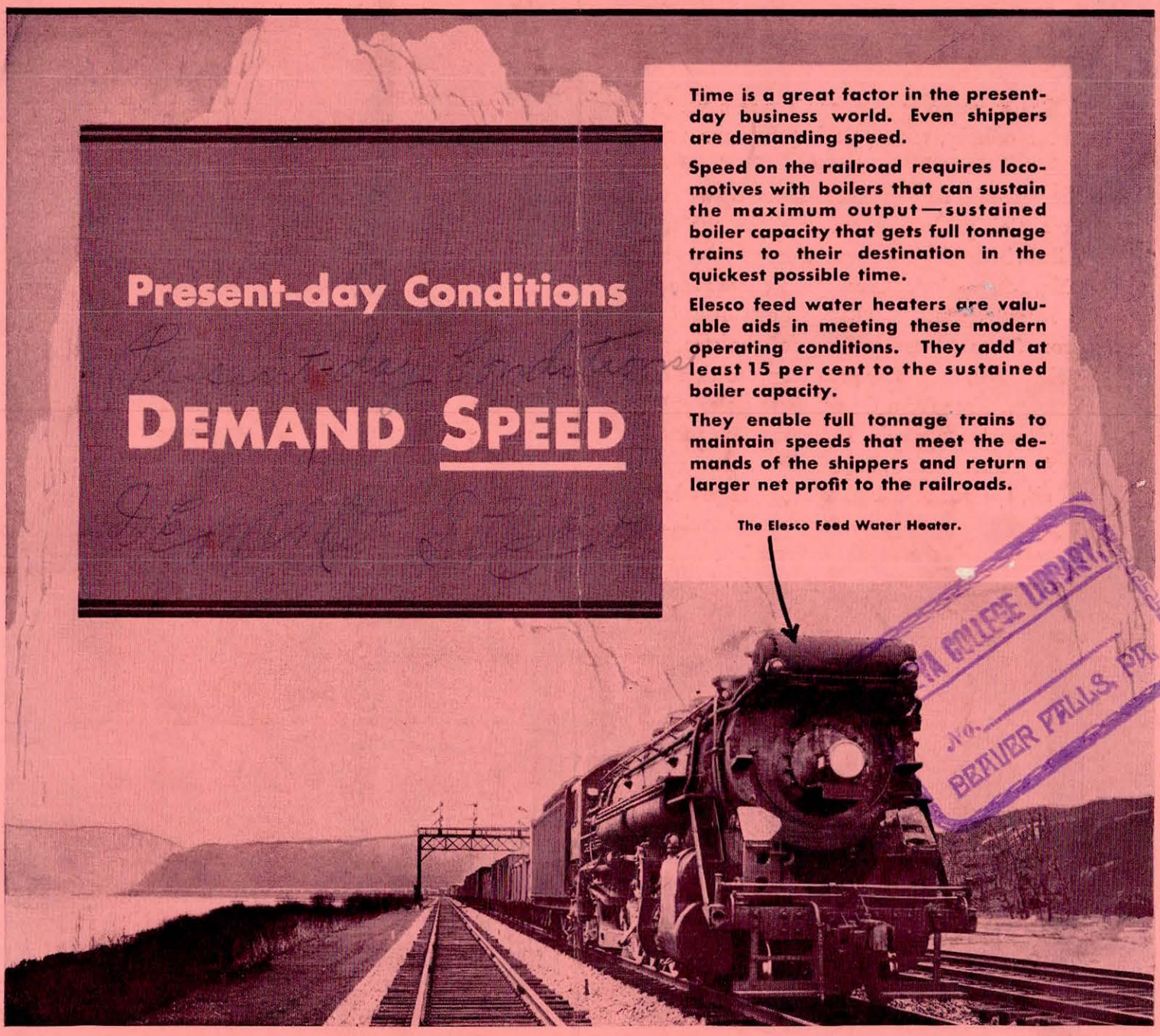
FEBRUARY 7, 1931

Railway Age

Founded In 1856


Present-day Conditions
DEMAND SPEED
Time is a great factor in the present-day business world. Even shippers are demanding speed.
Speed on the railroad requires locomotives with boilers that can sustain the maximum output—sustained boiler capacity that gets full tonnage trains to their destination in the quickest possible time.
Elesco feed water heaters are valuable aids in meeting these modern operating conditions. They add at least 15 per cent to the sustained boiler capacity.
They enable full tonnage trains to maintain speeds that meet the demands of the shippers and return a larger net profit to the railroads.
The Elesco Feed Water Heater.

THE SUPERHEATER COMPANY

60 East 42nd Street
NEW YORK

ELESCO

Peoples Gas Building
CHICAGO

A-571

Canada: THE SUPERHEATER COMPANY, Limited, Montreal

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Buyers Directory of Advertisers—Page 61

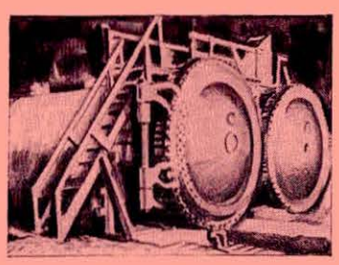
Measure your poles by the *YEAR-STICK!*

TO measure length, you'd use a yard-stick. Similarly, wise pole buyers have found a safe and all-inclusive measure of pole *value* . . . the year-stick. Poles that measure up well by the year-stick, you'll find, are poles that measure up a little better in just about every way — to be specific, International Creosoted Yellow Pine Poles.

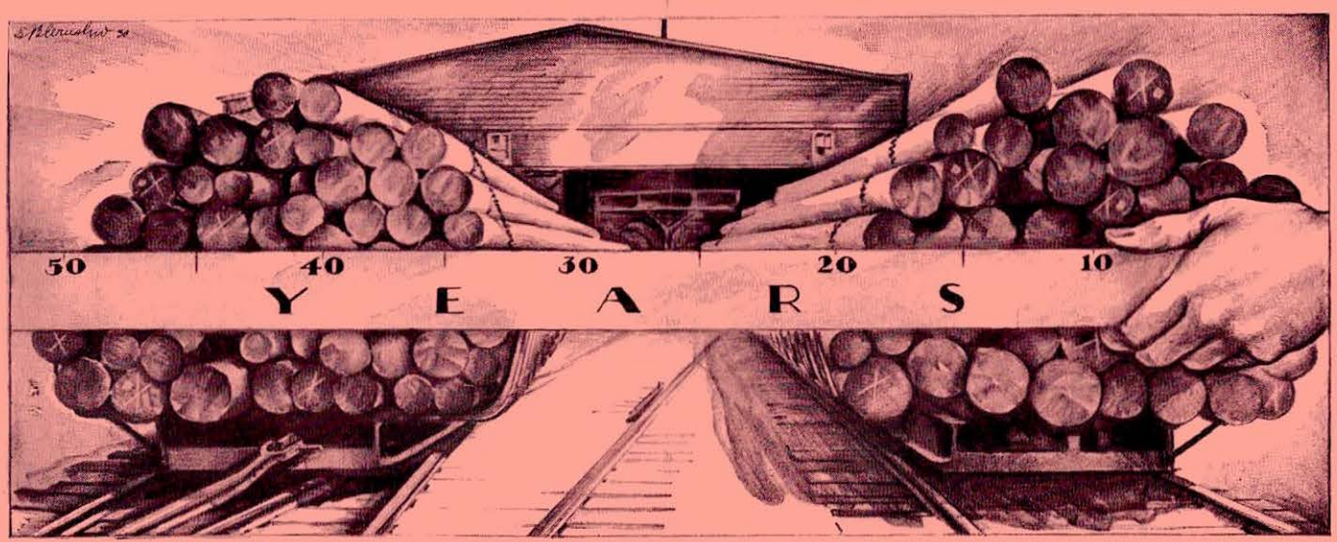
International Poles have an established life of from 35 to 40 years. Made of the strongest of pole woods, they offer greatest protection against damage. Free from decay, these poles are safer for linemen to climb. Hardware holds firmer.

And much more . . . including most important of all, the uniform high quality of product, integrity, and prompt performance associated for 50 years with the name, *International.*

Correct pressure . . the key to penetration



Every step in the application of preservative is carefully checked and re-checked. A complete system of modern indicating and recording gauges on the creosoting cylinders insures the right intensity and duration of pressure; and the right temperature. Thus the maximum penetration of the preservative is obtained. Experienced engineers supervise the whole process. Result — a protection from decay that has made International poles famous for their longer, stronger life.



3CI **International**

CREOSOTING & CONSTRUCTION CO.

PRODUCERS OF CREOSOTED YELLOW PINE POLES

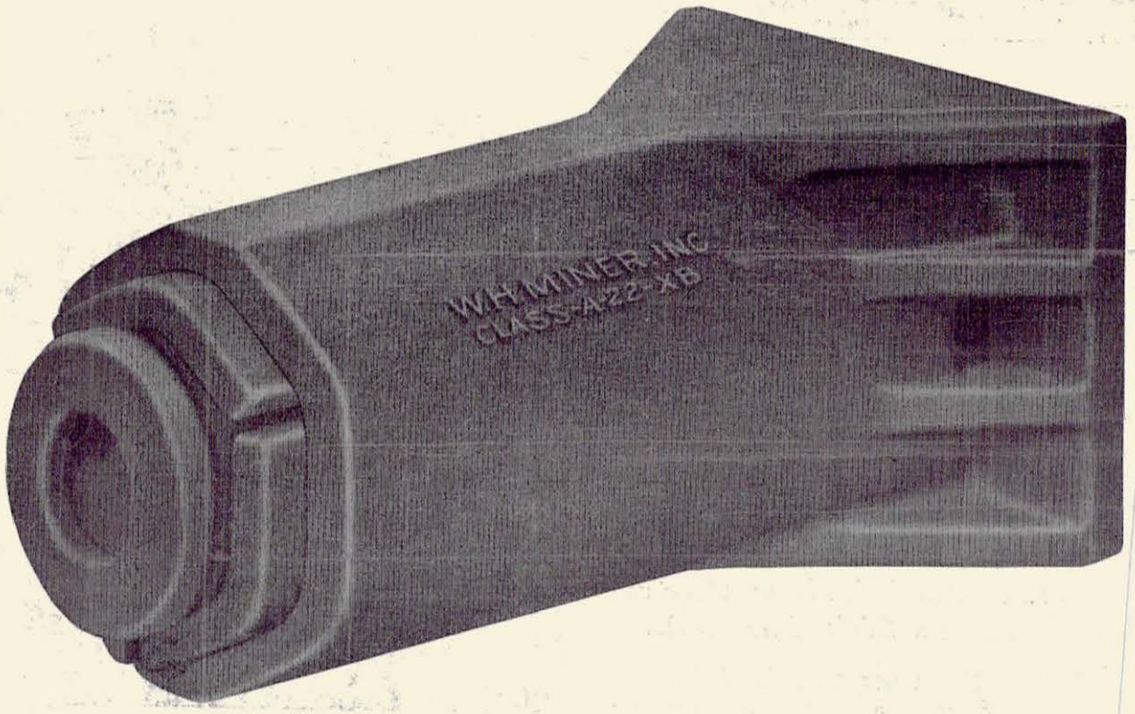
Galveston · Beaumont · Texarkana

DISTRIBUTED BY GRAYBAR

Published weekly by Simmons-Boardman Publishing Company, 34 North Crystal Street, East Stroudsburg, Pa. Entered as second class matter, March 9, 1928, at the Post Office at East Stroudsburg, Pa., under the act of March 3, 1879.
Address communications to 30 Church St., New York City.

MINER

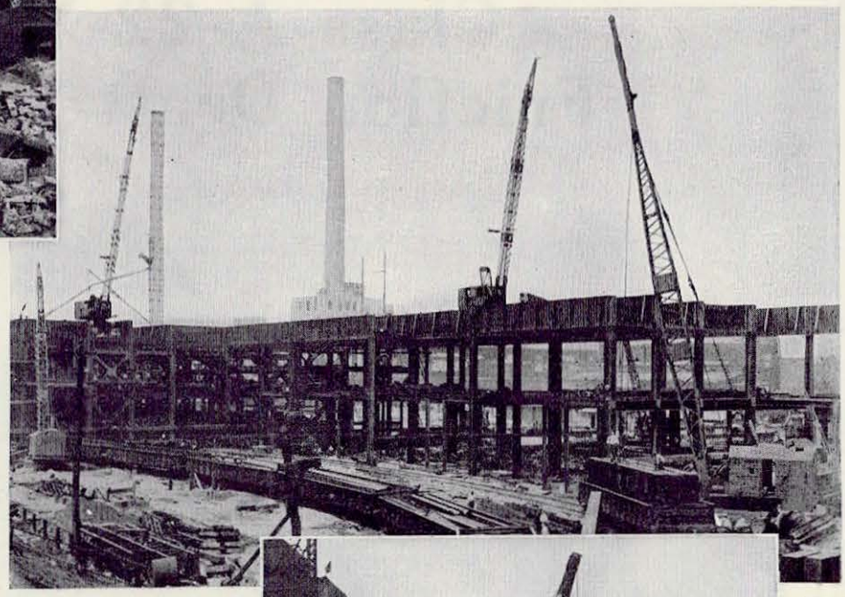
Class A-22-XB
Friction Draft Gear



Exceeds the A. R. A. Requirements for Certified Draft Gears

W. H. MINER, INC.
CHICAGO

On the Pennsylvania's New Terminal ~ *at West Philadelphia*



Above — Type DC gas shovel owned by Brann & Stuart excavating for the new terminal.

Right—Several of the Industrial Brownhoists used on the steel erection by The McClintic Marshall Co.

Below — Fifteen ton Industrial Brownhoist gas crawler crane placing tubs of concrete.

ON important construction projects, where only the most dependable contractors and equipment find a place, you will see Industrial Brownhoist locomotive and crawler cranes in the thick of the work.

In building the new terminal for the Pennsylvania Railroad at West Philadelphia, for example, several contractors used Industrial Brownhoists for excavating, placing forms, driving piles and for erecting the steel. Twelve of these locomotive and crawler cranes were in use at one time.

Because they move materials at lowest cost, leaders of American industry have bought thousands more Industrial Brownhoists than any other make of crane. If that kind of handling service interests you, we will gladly give you complete information on the right size and type of crane to meet your conditions.

Industrial Brownhoist Corporation, General Offices, Cleveland, Ohio

District Offices: New York, Philadelphia, Pittsburgh, Detroit, Chicago, New Orleans, San Francisco, Cleveland.

Plants: Brownhoist Division, Cleveland; Industrial Division, Bay City, Michigan; Elyria Foundry Division, Elyria, Ohio.

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Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office.

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Giving Permanency to Timber
Motor Transport Hearing at San Francisco
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A Mechanical Officer Appraises Results Of Water Treatment, by T. F. Powers
Conclude Waugh-Armour Reciprocity Case
Freight Car Loading

LOOKING BACKWARD

COMMUNICATIONS AND BOOKS

ODDS AND ENDS

NEWS

The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

Practical railroad men who know your technical needs

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GENERAL CABLE

GENERAL CABLE MEN know the technicalities of signalling and electric traction. They know the functions of wires and cables — what types to use and their application. They can discuss authoritatively the electrical problems of the railway field. At their call — and yours — General Cable men have the assistance of consulting specialists.

Your advantage is of practical value — a highly trained engineering staff for active cooperation with your own engineers.

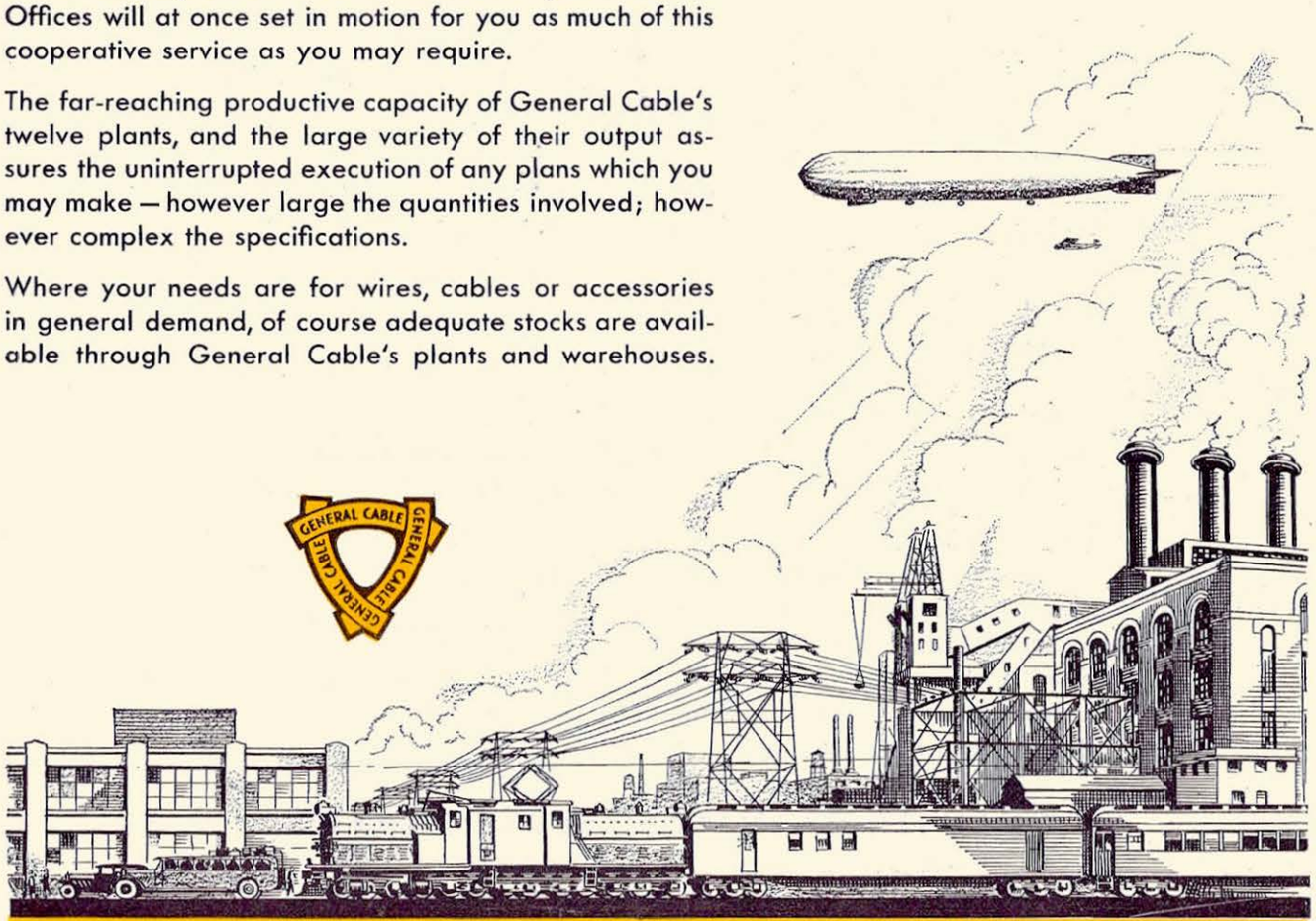
Further to round out the circle of service to you, these practical men bring into action, when needed, the complete facilities of General Cable's research laboratories.

They offer you the widest variety of conductor materials and insulations available. Thus they are able to recommend, without prejudice, the type of wire or coil best suited for any job.

A call on any of General Cable's twenty-two District Offices will at once set in motion for you as much of this cooperative service as you may require.

The far-reaching productive capacity of General Cable's twelve plants, and the large variety of their output assures the uninterrupted execution of any plans which you may make — however large the quantities involved; however complex the specifications.

Where your needs are for wires, cables or accessories in general demand, of course adequate stocks are available through General Cable's plants and warehouses.



DETROIT 827 Fisher Bldg.	LOS ANGELES 939 East Fourth St.	NEW YORK 420 Lexington Ave.	PITTSBURGH 1814 Koppers Bldg.	SAN FRANCISCO 465 Tenth St.	ST. LOUIS 1213 Ambas'dor Bldg.
KANSAS CITY Board of Trade Bldg.	MINNEAPOLIS 109 So. Seventh St.	PHILADELPHIA 123 South Broad St.	ROME, N.Y. Mill St.	SEATTLE 570 First Ave. South	WASHINGTON 704 Wilkins Bldg.

GENERAL CABLE CORPORATION

POSITIVE ALIGNMENT maintained in this special assembly

RUGGED end rings and spacer bars of special alloy steel provide lasting alignment for rollers in the Fafnir Melcher design. Rigidity is lasting under the most severe operating conditions. And filtered oil, distributed evenly over all contact surfaces by the extra large rollers, helps further to reduce cage friction.

Banishing friction while adding a maximum of strength and stamina has been the goal of the Fafnir-Melcher design. It is evidenced in the compact box which incorporates roller path, equalizer seat, pedestal guides, and oil reservoir in a single unit.

Less power required, less noise obtruding, less maintenance necessary—the natural result of Fafnir-Melcher Roller Journal Bearings. Small wonder that more and more railroads are coming to demand these operating refinements.

Every requirement fulfilled!

1. *Ample capacity to carry all loads without heating.*
2. *Positive lubrication at all speeds and temperatures.*
3. *Lateral adjustment possible when made necessary by truck wear or distortion.*
4. *Insulation from shocks and deadening of noise.*
5. *Interchangeability with A. R. A. equipment.*
6. *Simplicity of installation and maintenance.*

FAFNIR BEARINGS INCORPORATED

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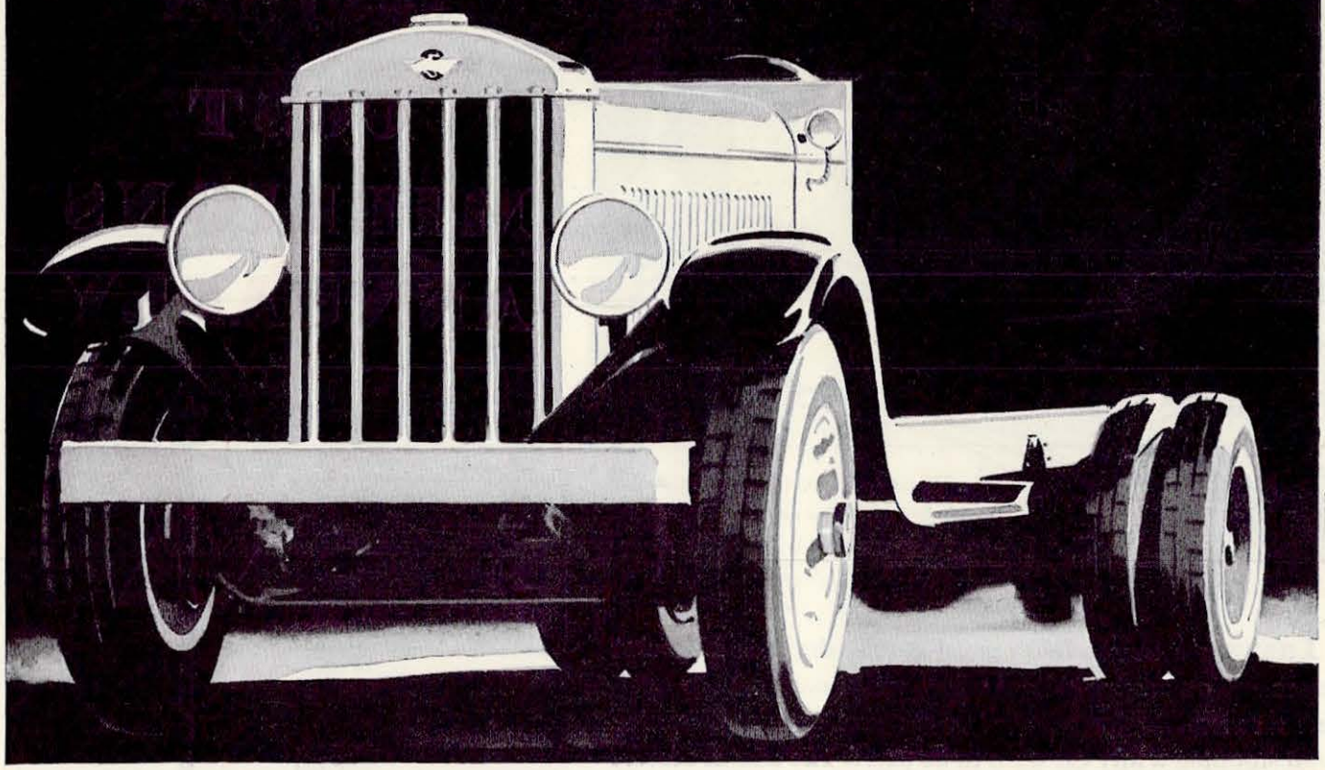
FAFNIR MELCHER

THE LOWEST PRICES IN REO HISTORY NOW PREVAIL



REO-
Now Better than Ever!

Bar-protected Radiators
Heavier Fenders
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PRICES—
$895 to $2525
Chassis F. O. B. Lansing, Michigan

MANY new and exclusive REO refinements, coupled with a record low price on the REO TONNER, have established new high standards of truck value.

Compare REO economy and long life factors—all-day speed on the highways and unrivaled agility in traffic; long-wearing chrome-nickel iron cylinder block and special alloy "Lo-Ex" pistons; REO-designed transmissions; the most effective brakes known to trucking; specially designed frames and springs; magazine oilers!

REO chassis and body combinations meet 95% of all haulage needs. See the latest REO SPEED WAGONS AND TRUCKS. Your REO dealer will gladly show how they will meet your requirements.

REO MOTOR CAR COMPANY, LANSING, MICHIGAN

SPEED WAGONS REO AND TRUCKS

"These two stops *to operate switch before and after ends of double track are eliminated by the 3-in-1 Switch Stand."*

Stops

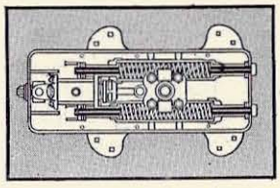
AT THE ENDS OF DOUBLE TRACK

COST MILLIONS ANNUALLY

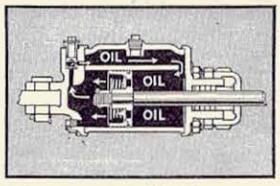
THERE is a tremendous annual cost at the ends of double track and on passing sidings where trains must stop to operate a switch. Engineers calculate the average cost of starting and stopping a fifty car train to be $2.50. The annual cost for this stopping and starting at a passing siding where ten trains pass daily is $18,250.00.

Such an expense is unnecessary. The Racor 3-in-1 Switch Stand combines in a single unit an automatic return after trailing train has passed, an oil buffer preventing return between successive pairs of wheels, and a rigid-throw always ready for hand operation. Trains approaching the 3-in-1 and having the right-of-way pass with safety to the train and switch points. The target rigidly attached always shows the exact position of the points.

Write today for complete printed information about the 3-in-1, a modern and mechanically efficient Switch Stand.



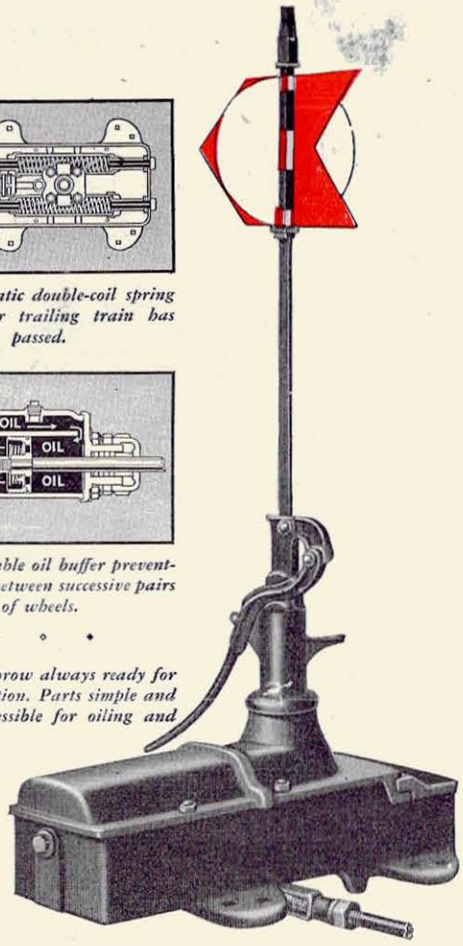
The automatic double-coil spring return after trailing train has passed.



The adjustable oil buffer preventing return between successive pairs of wheels.

◇ ◇ ◆

The rigid-throw always ready for hand operation. Parts simple and readily accessible for oiling and inspection.



RACOR TRADE MARK

RAMAPO AJAX CORPORATION

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Canadian Ramapo Iron Works, Limited . . . Niagara Falls, Ontario
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Nine Racor Works: **Hillburn, N. Y., Niagara Falls, N. Y., Chicago, Ill., East St. Louis, Ill., Superior, Wis., Pueblo, Col., Los Angeles, Cal., Seattle Wash., Niagara Falls, Ont.**

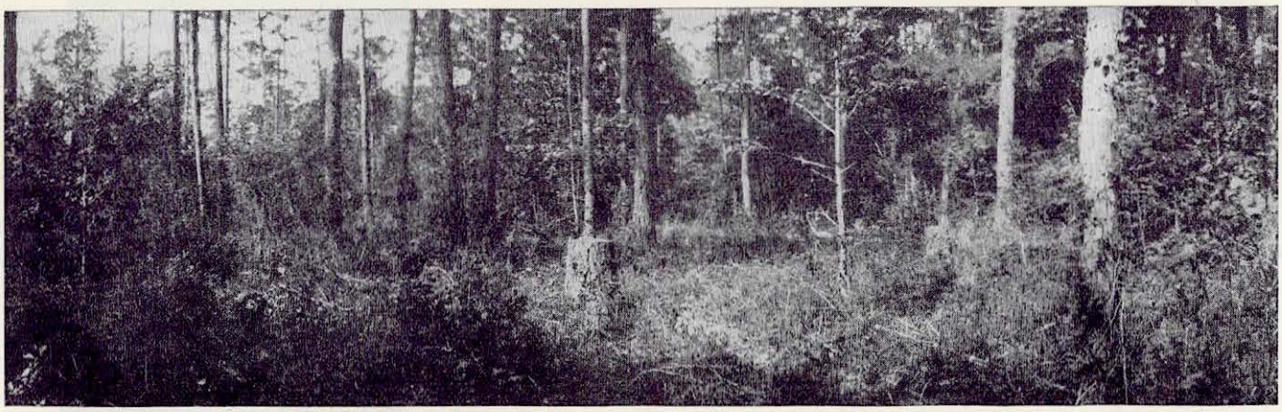
AMERICAN RADIAL COUPLERS

WITH the heavy forged key subject only to double shear » with all bearing contacts of large area, regardless of the angularity of the shank » with a simplicity of parts, the American Radial Coupler is applied without initial slack, while the large wear resisting areas prevent its accumulation. This protection is obtained with only a 90 pound increase of weight, in a device that is applied to A. R. A. sill construction.

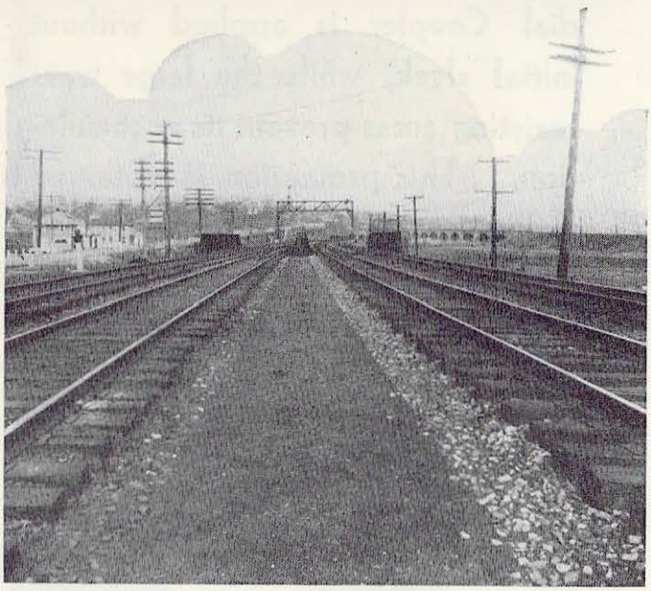
AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Consider PROVEN FACTS *about wood preservation*



Time-Tested Preservatives



WHILE the art of wood preservation dates back many centuries, the modern practice is based largely on the work that has been practically consecutive for the last hundred years. During this time many theories and preservatives have been used and a great deal of service data collected. Of all the preservatives only a few have survived the test of time and are recognized as standards of proven value. The qualities of these preservatives, in preventing decay and resisting other destructive agencies for long periods without injury to the wood or disadvantages in required applications, have been clearly demonstrated.

Creosote oil has been found most effective for most purposes and under most conditions. It is therefore the most generally used. Under some conditions, where a salt is preferable to an oil, zinc chloride is the accepted standard.

This company has rigidly adhered to the policy of using only time-tested preservatives. Service records of the material we have treated during our 25 years of operation fully substantiate the soundness of this policy.

AMERICAN CREOSOTING COMPANY
INCORPORATED

COLONIAL CREOSOTING COMPANY INCORPORATED

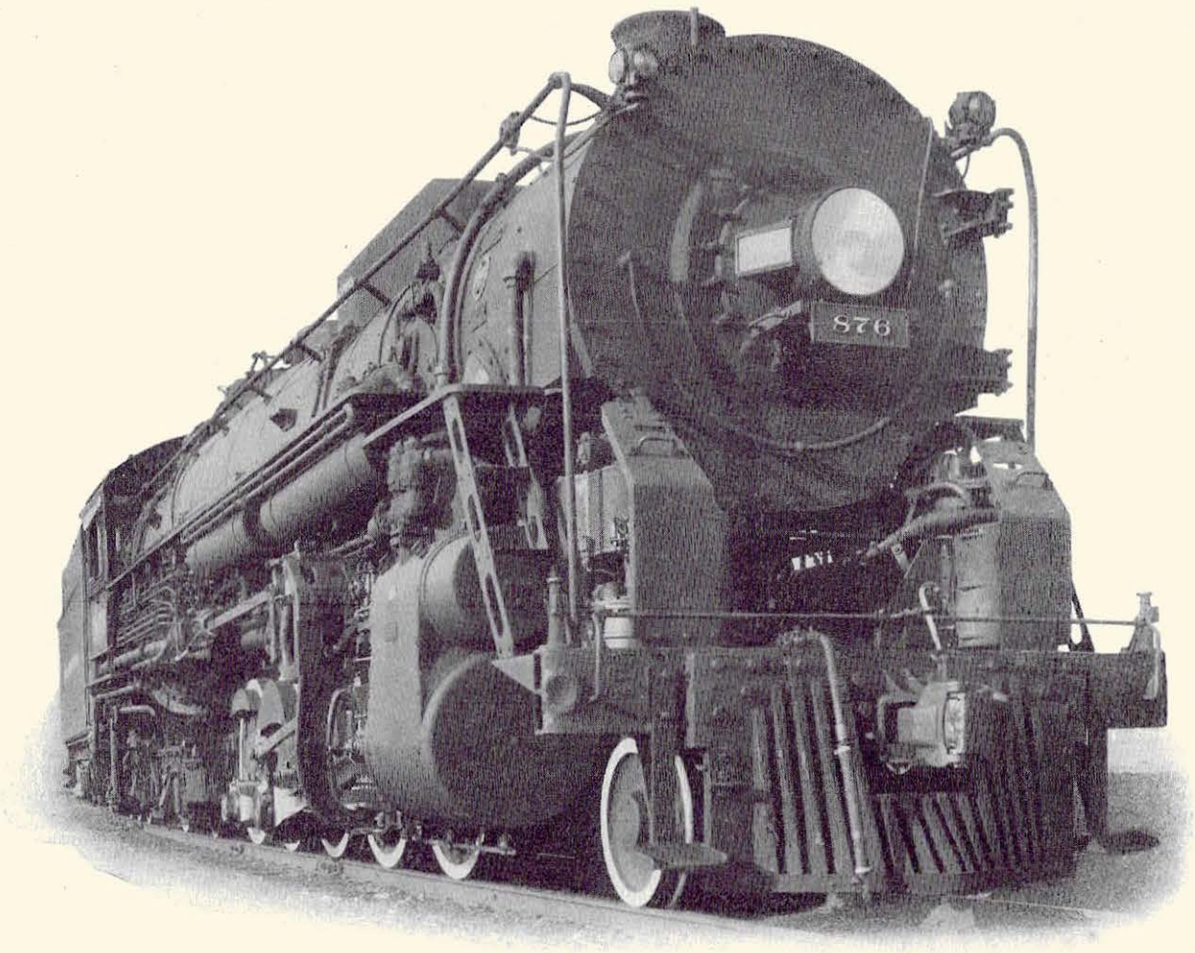
AMCRECO LOWRY PROCESS CREOSOTED WOOD

GEORGIA CREOSOTING COMPANY INCORPORATED

LOUISVILLE — KENTUCKY

RA 2-7 Gray

One hundred years' experience built into every Baldwin



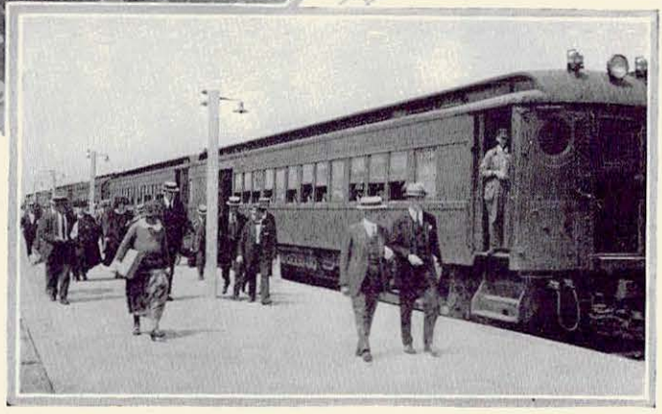
THE BALDWIN LOCOMOTIVE WORKS 1831 1931

THE outstanding achievement attained in the building of nearly 62,000 locomotives is our recognized ability to design and construct motive power which will meet today's heavy traffic demands and materially increase the earning power of the railroads.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

Scaling the Peaks *that the clock piles up . .*



FIVE o'clock! — The rush hour is on. Thousands and thousands of commuters are hurrying to their suburban homes. Swiftly and safely hundreds of Westinghouse-equipped multiple unit cars on railroads serving metropolitan centers are efficiently caring for these passenger peaks that the rush hour piles up.

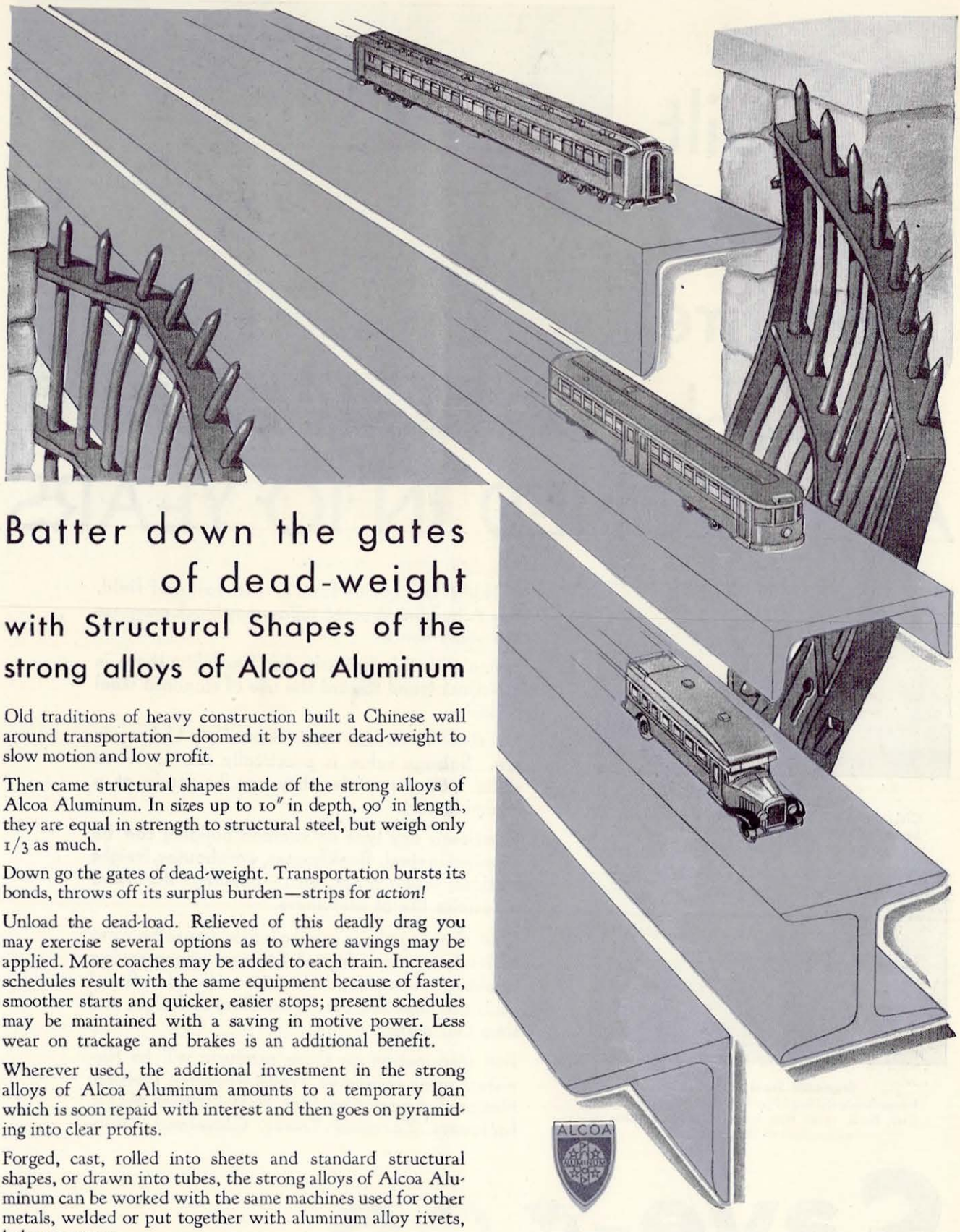
Besides bringing the advantages of suburban life to city workers, electrified suburban service has greatly increased terminal facilities, afforded more desirable industrial sites, and greatly enhanced suburban real estate values.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

T 31673

TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.



Batter down the gates of dead-weight

with Structural Shapes of the strong alloys of Alcoa Aluminum

Old traditions of heavy construction built a Chinese wall around transportation—doomed it by sheer dead-weight to slow motion and low profit.

Then came structural shapes made of the strong alloys of Alcoa Aluminum. In sizes up to 10″ in depth, 90′ in length, they are equal in strength to structural steel, but weigh only 1/3 as much.

Down go the gates of dead-weight. Transportation bursts its bonds, throws off its surplus burden—strips for *action!*

Unload the dead-load. Relieved of this deadly drag you may exercise several options as to where savings may be applied. More coaches may be added to each train. Increased schedules result with the same equipment because of faster, smoother starts and quicker, easier stops; present schedules may be maintained with a saving in motive power. Less wear on trackage and brakes is an additional benefit.

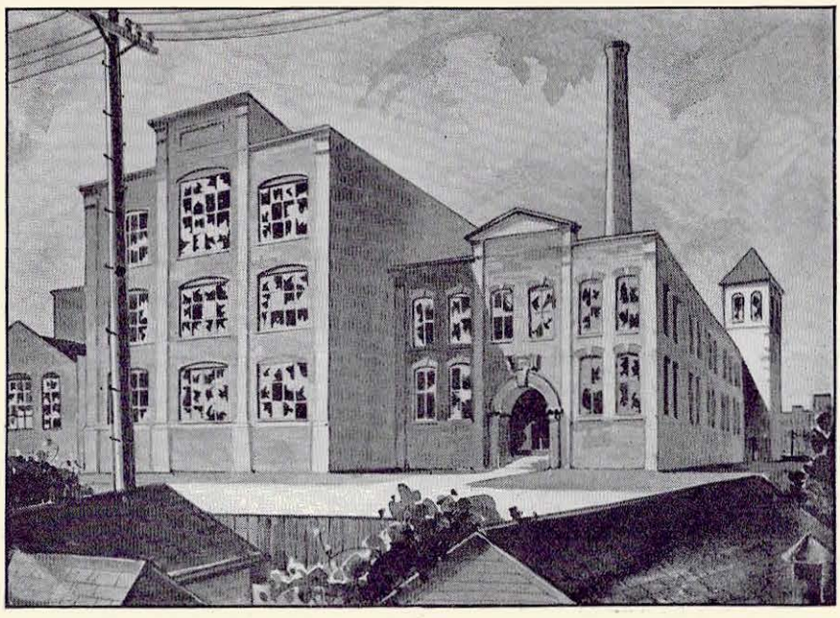
Wherever used, the additional investment in the strong alloys of Alcoa Aluminum amounts to a temporary loan which is soon repaid with interest and then goes on pyramiding into clear profits.

Forged, cast, rolled into sheets and standard structural shapes, or drawn into tubes, the strong alloys of Alcoa Aluminum can be worked with the same machines used for other metals, welded or put together with aluminum alloy rivets, bolts or screws.

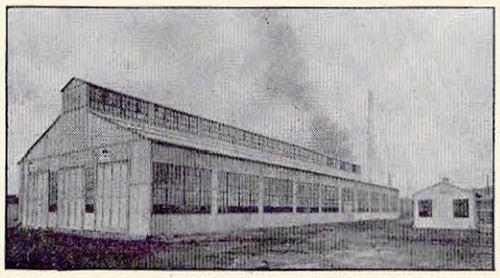
Send for the engineering handbook, "Structural Aluminum," $1.00 per copy. ALUMINUM COMPANY *of* AMERICA; 2478 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA ALUMINUM

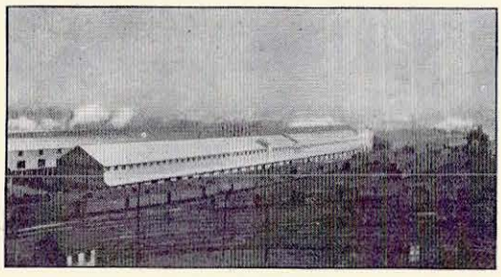
Built to Endure . . . . but



ABANDONED IN 10 YEARS



Boiler Repair Shops
Citico Engine Terminal, Southern Railway System, Chattanooga, Tenn. Note also, small office building at right of illustration.



Standard Steel Buildings
Pennsylvania Railroad Pier K; Warehouse, Jersey City, N. J. 1300 feet long. Over 200,000 square feet of floor space.

CHANGE comes fast in the railroad field. A building erected today, may block progress five years hence.

In line with this necessity for flexibility, there is a distinct trend toward the use of standard steel buildings.

For steel structures are inexpensive. Upkeep is low. Salvage value is practically 100%. When shifts must be made, they can be made at a minimum cost.

Practically any type of railroad building can be supplied in steel. Bunk houses, warehouses, freight stations, repair shops, etc.,—buildings that have a definite life of usefulness.

Steel shelving also is coming into wide use because of its low cost, adaptability and space-saving qualities—important items to railroads. Steel skids are speeding up the handling of freight and time and money.

Full information on these products will be furnished upon writing to Trade Research Division, National Association Flat Rolled Steel Manufacturers, Terminal Tower, Cleveland, Ohio.

Save- Labor Fire Loss Money with Steel

AIR CONDITIONED CARS

Comfortably Cool Inside—Tropical Temperatures Outside

PULLMAN CAR & MANUFACTURING CORPORATION

BUILDERS

General Offices: Chicago, Illinois

Eastern Sales Office: 52 Vanderbilt Avenue, New York City

Pacific Coast Sales Office,
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San Francisco, Calif.

Washington Sales Office,
805 Munsey Bldg.,
Washington, D. C.

Birmingham Sales Office,
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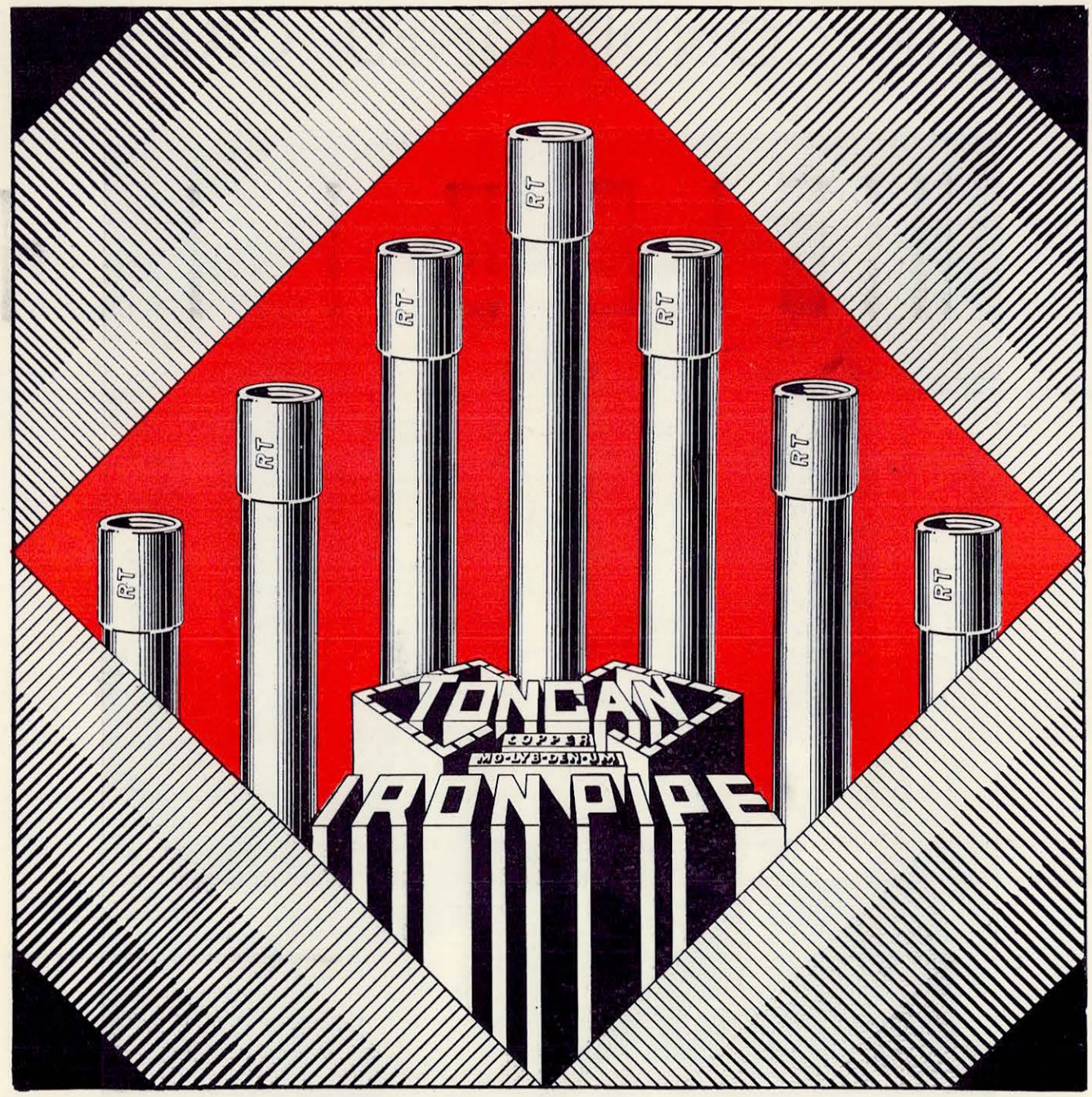
Birmingham, Alabama



PERMANENCE — ALL THE WAY THROUGH

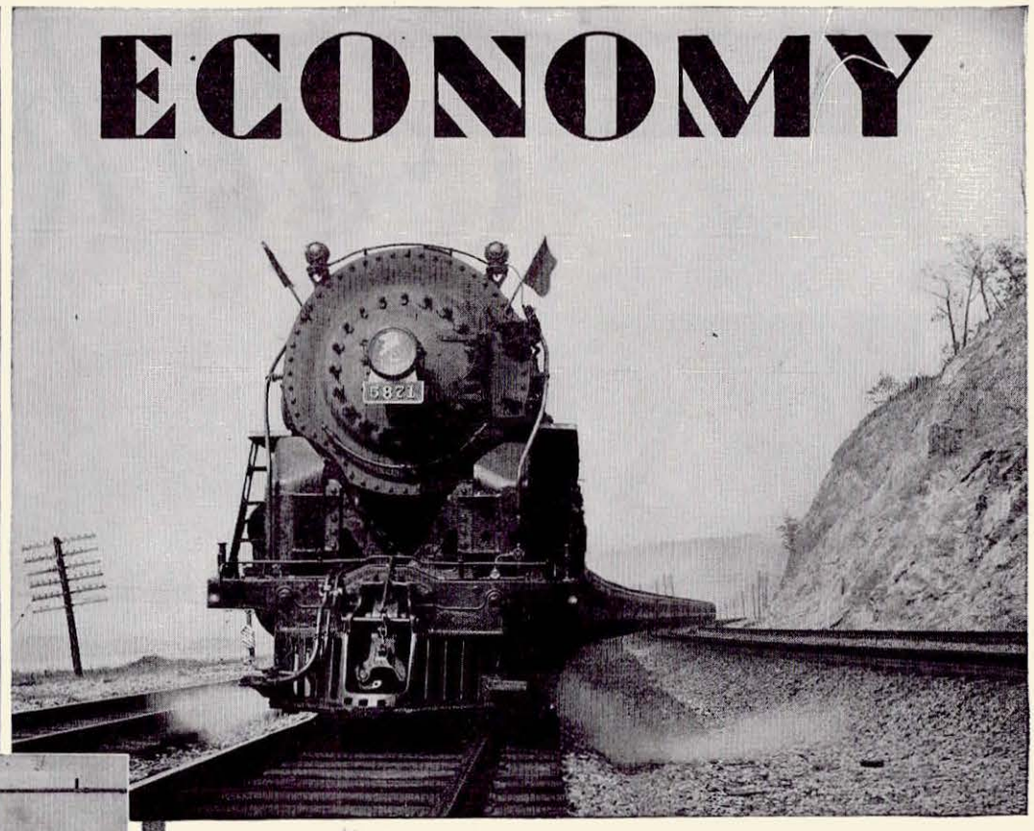
FROM the beginning of its manufacture, Toncan Iron Pipe is processed to withstand the ravaging attacks of rust and corrosion. Its power to resist the elements that cause early failure of ordinary ferrous pipe is not confined to the "skin" or surface of the metal, but is worked into every tiny grain of the alloy so that its permanence is uniform throughout the entire thickness of the pipe wall.

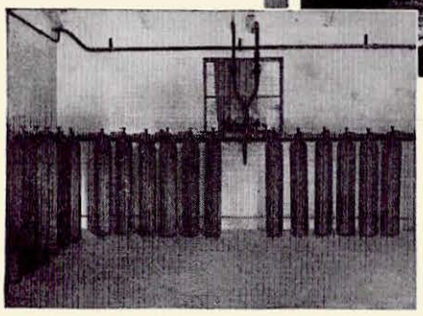
Let us tell you about the records this Copper Molybdenum Iron Pipe has made in places where corrosion is severe.

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

ECONOMY





Oxweld Wall Type Oxygen Manifold installed in Oxweld Standard Generator House

ECONOMICAL generation of acetylene and dependable, waste-proof distribution of oxygen and acetylene for railroad welding and cutting operations are among the salient features of Oxweld Railroad Service. Qualified by years of experience in this work, Oxweld engineers estimate accurately the railroad requirements and furnish and install equipment that has proved most efficient and economical.

Under their supervision, acetylene generators and oxygen manifolds are installed. Oxwelded piping systems are built to insure steady, uninterrupted supplies of gases to points where work is to be done. Handling of gas cylinders is eliminated. No time lost by operator's changing hose and regulators. No interference or delay to other workmen due to cylinders in the way.

Because Oxweld Railroad Service insures maximum economy in oxy-acetylene welding and cutting, the majority of Class I roads contract for it year after year.

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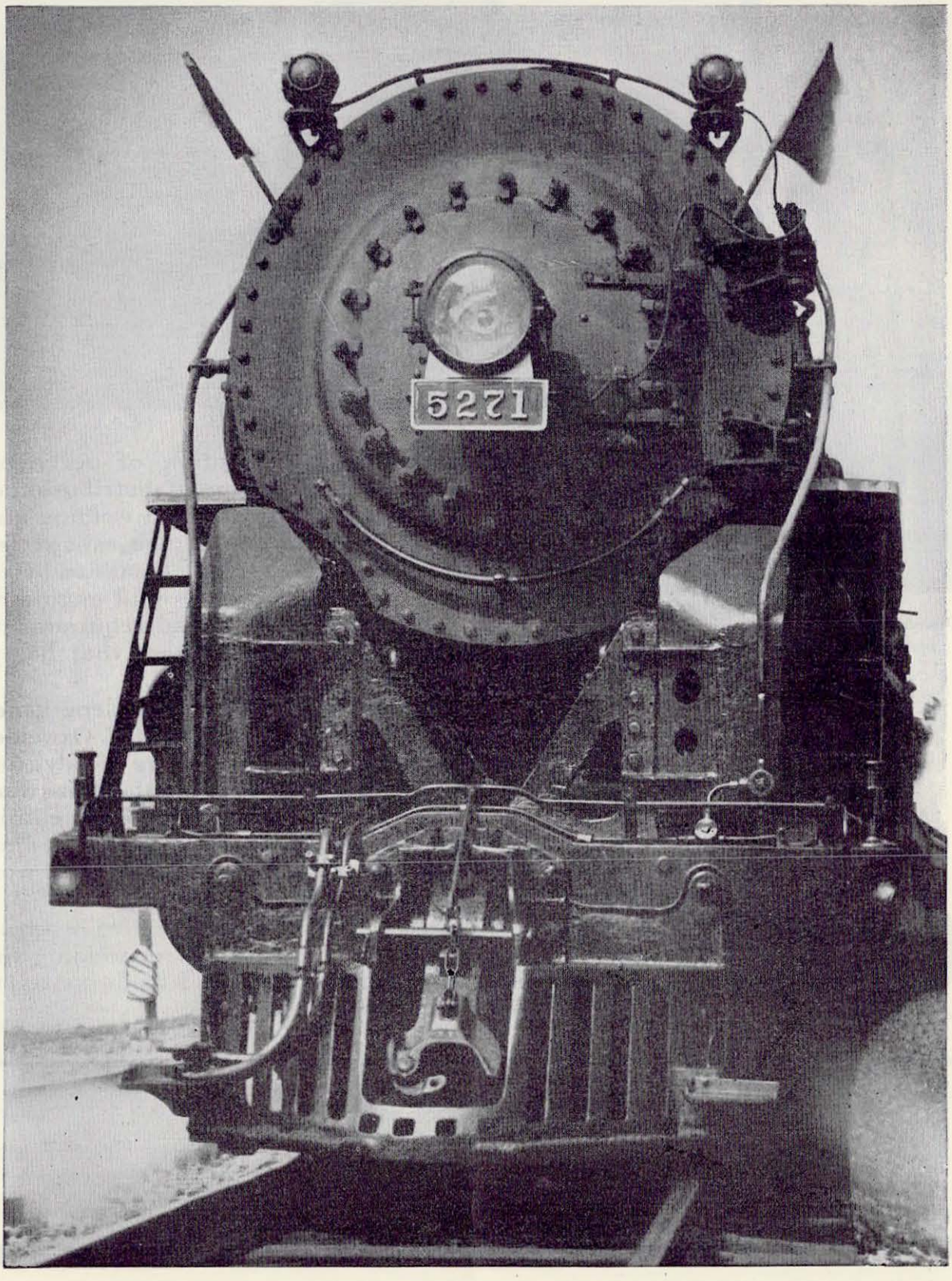

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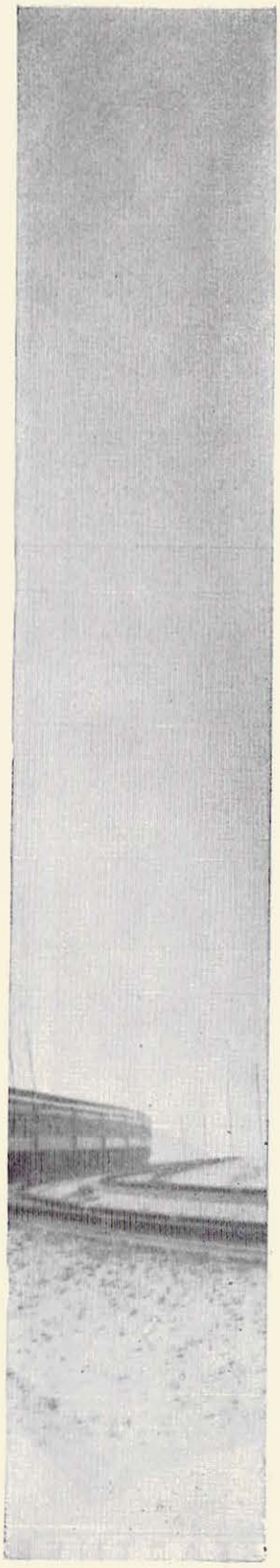

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go the trucks of the limited. Speeding through the country. Highballing home on time. Passengers know it. Expect it.

That's service. People rarely think of it unless it goes wrong. Then there's trouble. But we can't tell you railroad men anything about that. You know, better than we, the importance of service.

Thousands of little things go to make up service. To most people, a storage battery is a pretty insignificant affair. It's certainly no world-beater for looks. But it plays a vital part in railroad service.

We make Exide Batteries to play that part with the utmost in dependability and economy. And they do it. That's why the great majority of roads choose Exides. And there's not a railroad application for which an Exide isn't built. Behind every one stand the reputation and experience of the world's largest manufacturers of storage batteries for every purpose.

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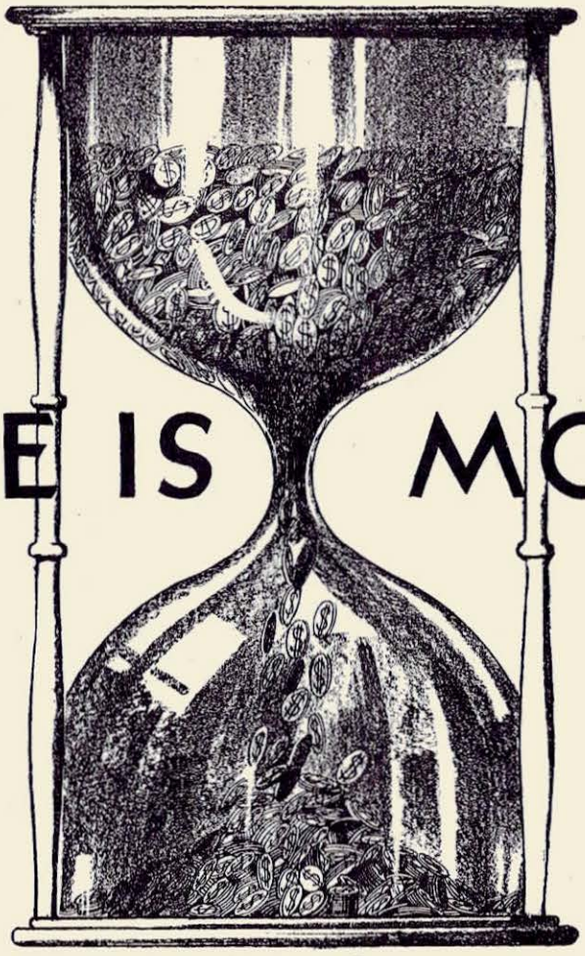

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-in the life of a freight car

A car's earning capacity depends upon how long it can be kept in revenue service. Good draft gears *increase* the earning capacity by providing adequate protection against the shocks of collision—thus keeping cars off the rip track and in revenue service more days per year, and more years before they must be discarded.

Replace present inadequate draft gears with Cardwell or Westinghouse Draft Gears.

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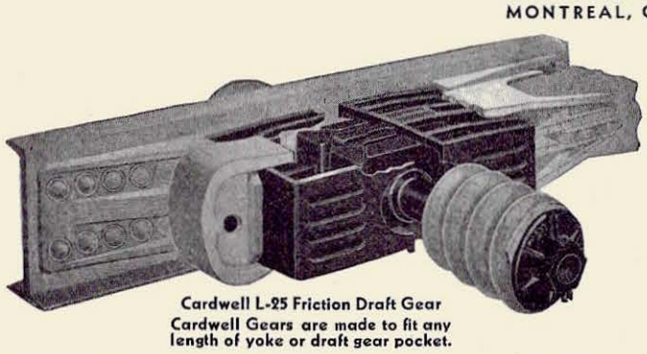
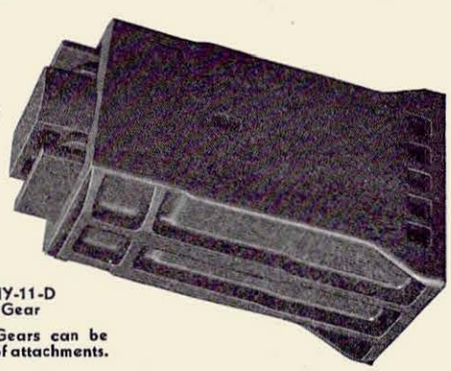


Cardwell L-25 Friction Draft Gear
Cardwell Gears are made to fit any length of yoke or draft gear pocket.

Cardwell and Westinghouse Draft Gears

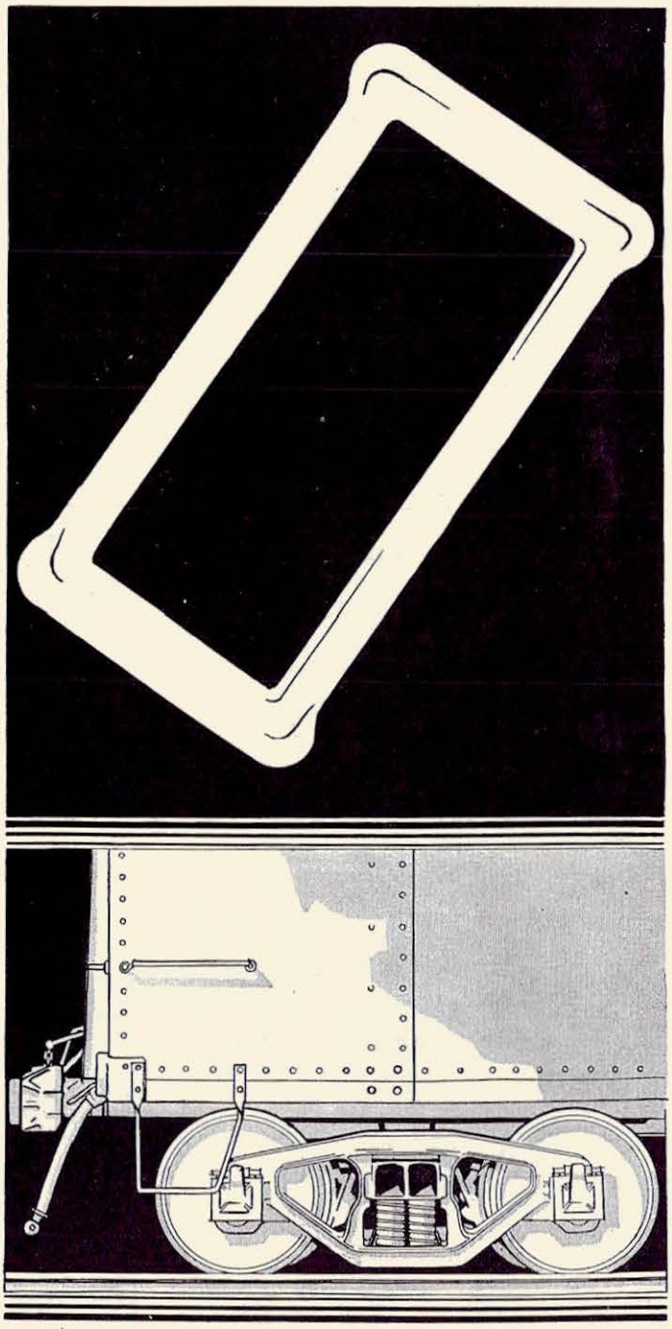
Are made in sizes and capacities to meet all modern and A. R. A. requirements for locomotives, freight and passenger cars.



Westinghouse NY-11-D Friction Draft Gear
Westinghouse Draft Gears can be applied with any type of attachments.

GOOD DRAFT GEARS MAKE CARS GO FARTHER

SPECIALLY BUILT *for a* DEFINITE PURPOSE



A SPECIAL forging process, special wear resisting steel plus fifteen years experience in the design and manufacture of brake gear details for railroad cars is the reason for the safe economical service of the Schaefer Loop Hanger.

It is drop forged in one piece entirely free from welds and reinforced to provide the greatest strength where strength is most needed.

Used with the Schaefer wearing plate, wear on the side frame hanger bracket is eliminated, giving longer, more economical side frame life.

Application is merely a matter of slipping it in place—the A. R. A. "U" cotter locks it in position.

Schaefer Loop Hangers justify the investigation of both operating and mechanical departments.

Ask for Descriptive Bulletin!

SCHAEFER EQUIPMENT COMPANY

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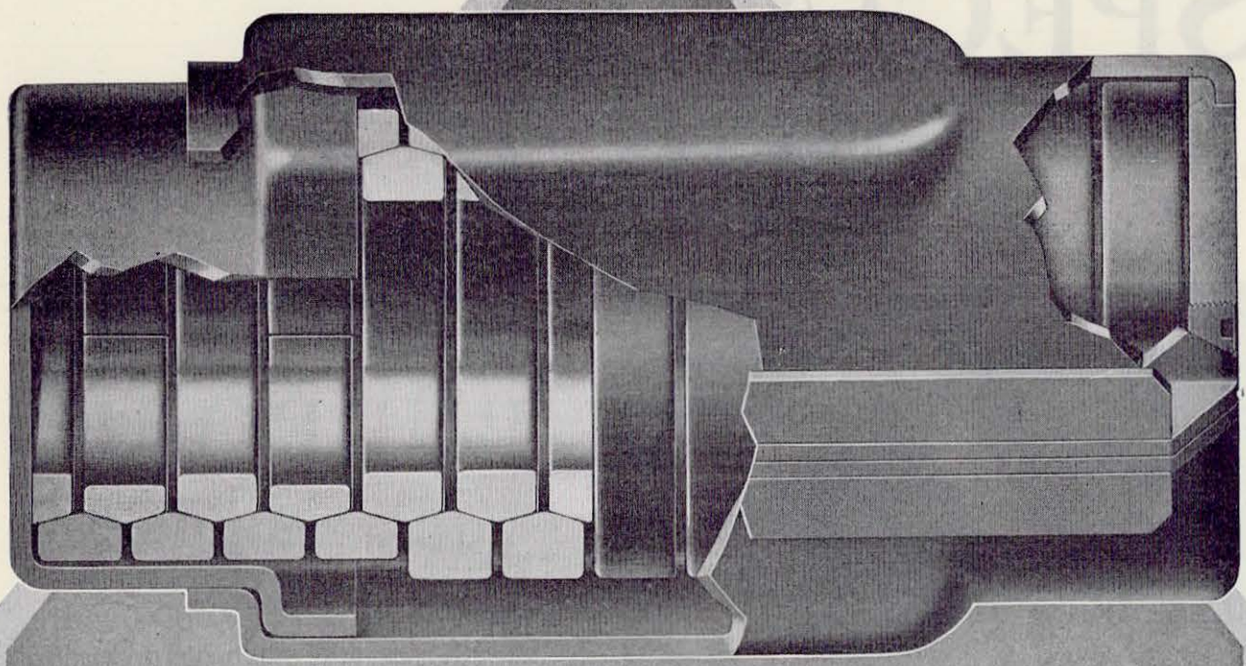

EQUIPMENT PROTECTION

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Ask for Circular R-4—it tells the story in detail.

Edgewater Steel Company

Pittsburgh, Penna.

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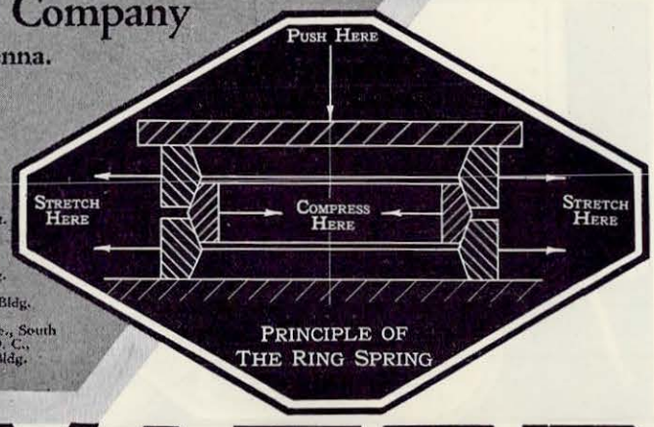
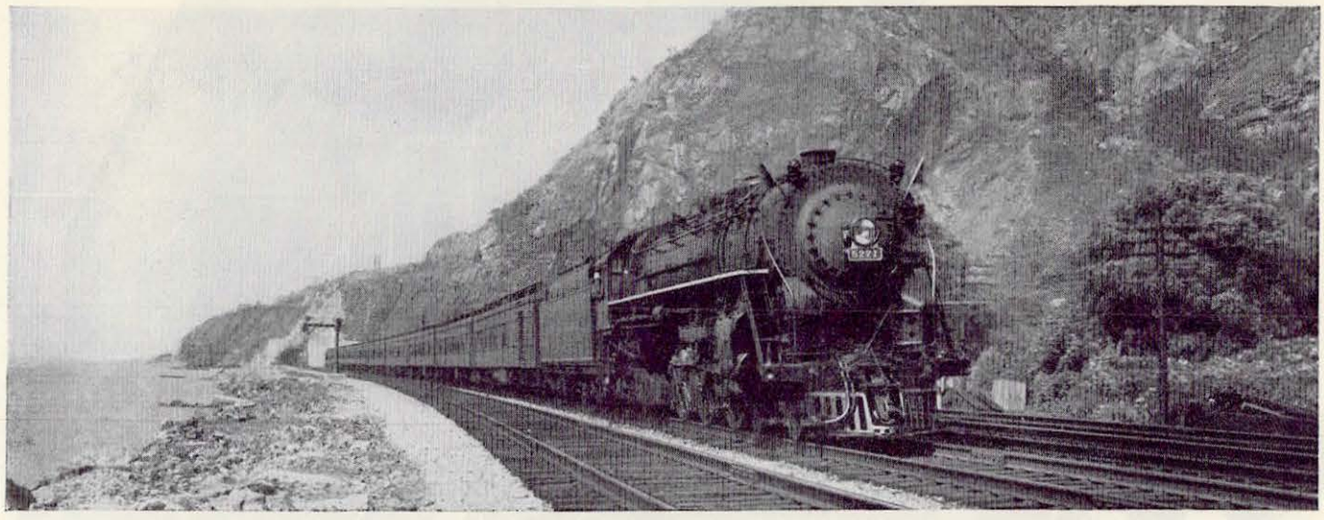
St. Paul, Minn., Merchants Bank Bldg.
Seattle, Wash., 2929 First Ave., South
Washington, D. C., Munsey Bldg.



PRINCIPLE OF THE RING SPRING

EDGEWATER RING SPRING DRAFT GEAR

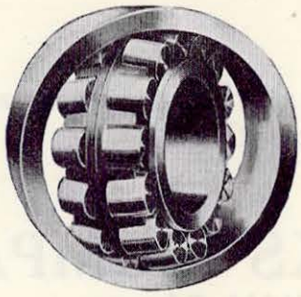
The 50 New Hudson Type Locomotives ALL Have SKF Engine Truck Bearings



THE dependable performance of 128 New York Central locomotives already using SKF engine truck bearings led to the choice of SKF for the 50 new Hudson Type locomotives now under construction.

Continuity of service is of paramount importance on that noted fleet of fast trains served by the Hudson Type locomotives.

SKF engine truck bearings are a safeguard against trouble in a bearing location that has been notoriously difficult to lubricate.



Service is severe but SKF thrives on severe service, running from shopping to shopping without delay or bearing trouble of any kind.

Bearing trouble cannot become acute when SKF serves the equipment.

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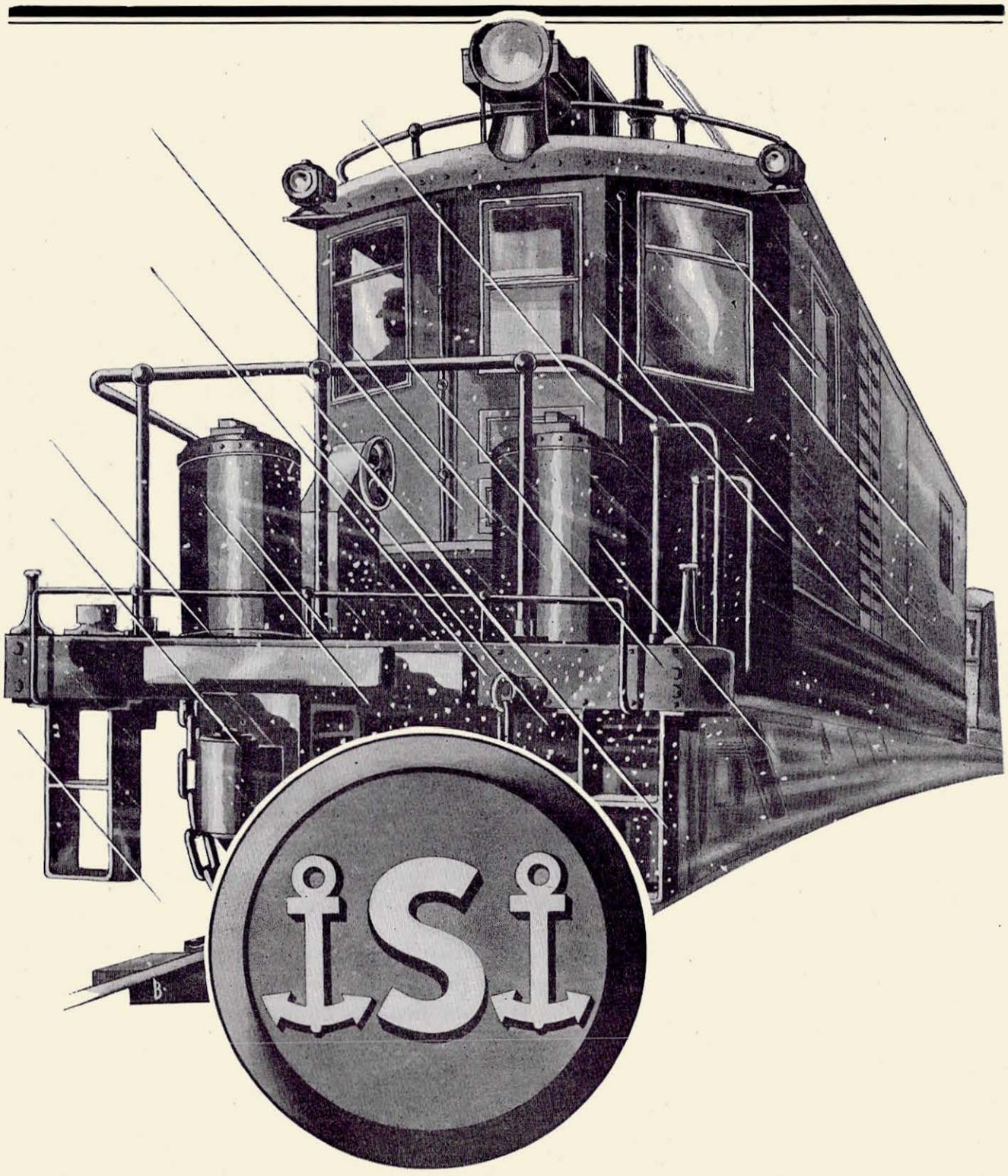

On electric locomotives, "Standard" wheels, tires and axles are living up to the name created and proved over years of satisfactory operation on steam locomotives.

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These Timken Advantages Will Decrease Your Train-Mile Costs

The advantages of Timken Tapered Roller Bearings in passenger cars, locomotives and tenders may be classified under four main heads—Efficiency, Protection, Comfort, Economy.

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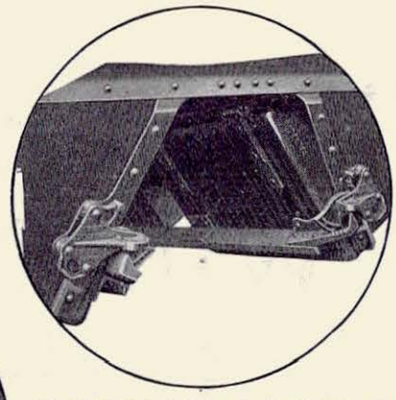
It's all in the exclusive combination of Timken tapered construction, Timken positively aligned rolls, Timken-made steel and Timken precision of manufacture.

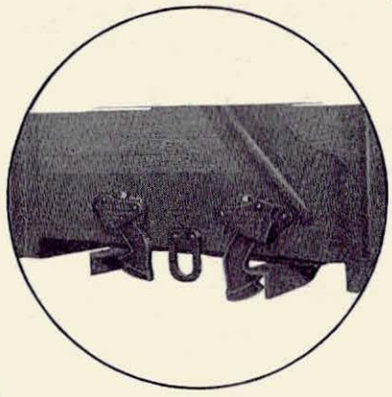
With Timken benefits in your favor you can meet every modern operating requirement and make more money. The Timken Roller Bearing Company, Canton, Ohio

TIMKEN *Tapered Roller* **BEARINGS**

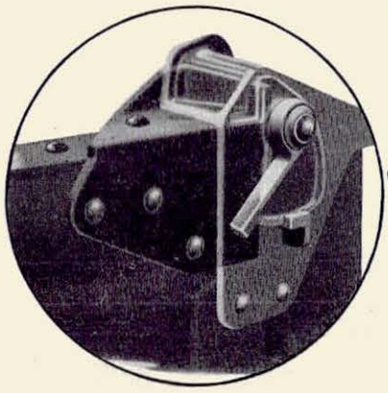
Wine Appliances



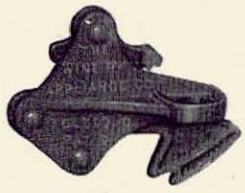
HOPPER DROP DOOR LOCKS



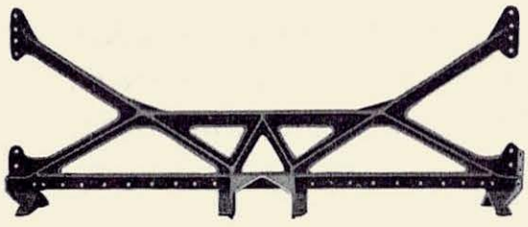
GONDOLA DROP DOOR LOCKS



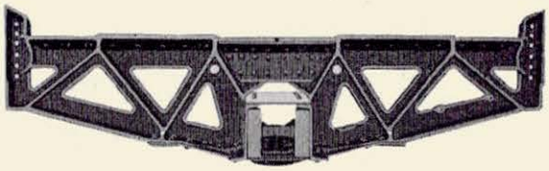
GONDOLA DROP END LOCK



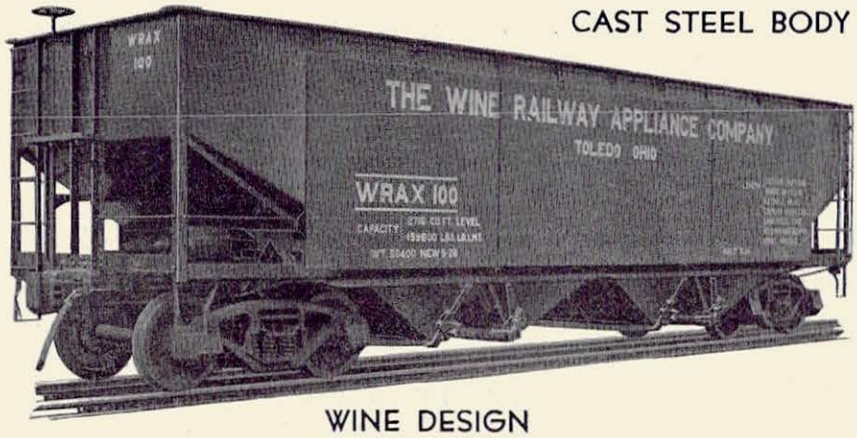
CAST STEEL
HOPPER FRAME



CAST STEEL CROSS-BEARER



CAST STEEL BODY BOLSTER



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SEVENTY TON HOPPER CAR

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Flat plate doors mean frequent carding to rip-tracks.

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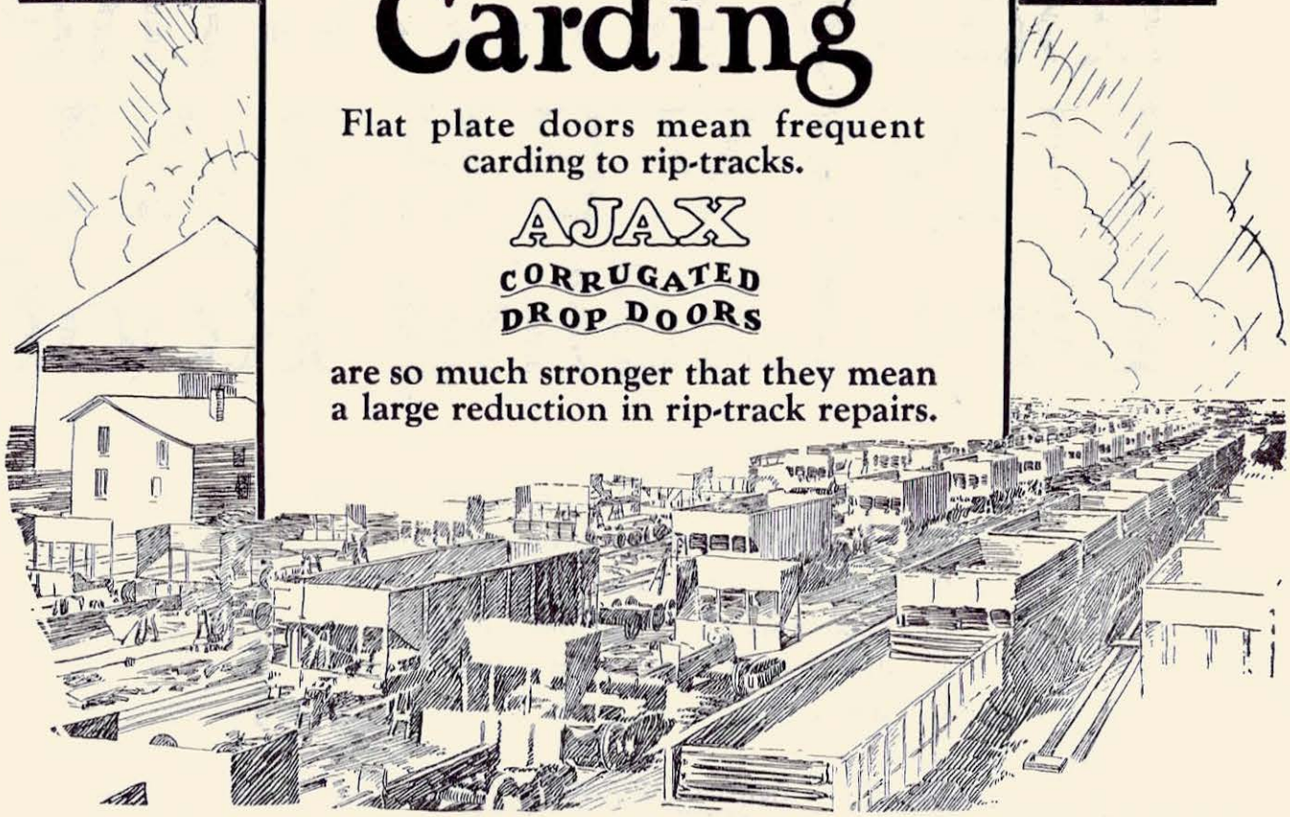
are so much stronger that they mean a large reduction in rip-track repairs.



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..... As far as car construction goes....the most economical thing today is.....the UNIVERSAL Dry Lading Roof

THE Universal Dry Lading Roof is the only roof that has one size and one design parts which are adjustable and will make a weatherproof roof on any size or design of house car on standard gauge track.

HUTCHINS CAR ROOFING COMPANY
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Established 1880

Commission Proposes Revolution in Rate Legislation

Considering both recent and prospective traffic and earnings, the railroad industry is probably in as serious a condition at present as it ever has been. With this situation existing, which is principally due to the policy of regulation that has been followed by the Interstate Commerce Commission, the commission is recommending and Congress is considering legislation that would radically change the Transportation act and greatly increase the statutory power of the commission.

The latest recommendations of the commission were made on January 21 in a letter to Senator Couzens, chairman of the Committee on Interstate and Foreign Commerce of the Senate. These recommendations are that the recapture provisions shall be repealed and that the rate-making provisions shall be so changed that Congress will in effect direct the commission to regulate rates and earnings in complete disregard of the constitutional rights of the railways, as defined by the Supreme court.

Repeal the Recapture Provisions

The rate-making and recapture provisions both appear in Section 15-A. They were intended by Congress to supplement each other, and it was assumed, of course, that both would be carried out. The rate-making provisions have never been carried out, however, the railways as a whole having never in any year since they were passed earned a fair return. It would be only fair, therefore, that roads which, in one or more years, have made recapturable earnings should be relieved of paying them. Whether the recapture provisions should be entirely repealed depends upon whether their retention probably would afford an effective incentive to the commission to so fix rates in future as to give the railways opportunity to earn a fair return upon a fair valuation, as defined by the Supreme Court. The experience of eleven years under the Transportation act, and the commission's letter to Senator Couzens indicate that the commission is determined not to so regulate rates. Therefore, the recapture provisions should be entirely repealed. Their repeal, however, would contribute little toward the solution of the railroad problem, as it would not benefit the large majority of roads having earnings insufficient to make them subject to recapture.

The question as to what changes should be made in the rate-making provisions is, in a legal sense, at least, the most important of all questions regarding federal regulation of railways. The commission renews its recommendation that legislation shall be passed by which Congress would direct it to substitute "rate bases", arrived at by the method of "valuation" used by it in the O'Fallon case, for valuations made in accordance with the decisions of the Supreme court. It further recommends that it shall be directed to determine from time to time and make public what percentage of the aggregate rate bases of the operating carriers constitutes a fair return, and that in making this determination it shall consider the transportation needs of the country; the necessity, in the public interest, of the carriers being able to attract capital; and the necessity, in the public interest, that the carriers shall furnish transportation to shippers and travelers at the lowest rates consistent with the rendering of good service. "The fact that such aggregate net railway operating income falls below such amount (a 'fair return') in times of economic depression, or rises above it in times of economic prosperity, shall not necessarily be regarded as a reason for raising or reducing rates, as the case may be; but the duty of the commission in the exercise of sound discretion shall be to maintain so far as possible a general level of rates which, over a period of years, will produce earnings consistent with the principles above set forth."

A Proposal to Disregard the Constitution

The existing rate-making provisions direct the Commission to give the railways opportunity to earn a fair return upon a fair valuation in accordance with the federal constitution, as interpreted by the Supreme court, and tell it how Congress wishes it to adjust rates in order to accomplish this result. By the legislation

recommended by the commission in its letter to Senator Couzens *Congress would direct the commission not to so adjust rates as to give the railways opportunity to earn the constitutional fair return upon a fair valuation.* A "rate base" arrived at by the commission's method would be much less than a constitutional valuation and it could adopt any percentage of this "rate base" that it pleased as a "fair return". Thus the commission would be given virtually unlimited discretion in determining the amount of net operating income the railways should be allowed to earn.

Under the existing rate-making provisions the railways can appeal from the commission to the courts upon the ground that the commission is not regulating rates in accordance with the directions given by Congress in these provisions. Under the proposed legislation the railways could not appeal to the courts upon the ground that the commission was not carrying out the statutory instructions of Congress, because virtually the only instructions the commission would have from Congress would be to regulate rates in accordance with its own "sound discretion". The railways would be left, as they were before the Transportation act was passed, with no protection from unfair regulation by the commission excepting the right to appeal to the courts upon the ground that their property was being confiscated in violation of the constitution.

To say that this would not involve a change in the law that would be highly unfavorable to the railways, and therefore of great importance, is absurd. It would involve a complete revolution in the law of rate-making, and it is significant that five of the six members of the commission who are lawyers—Chairman Brainerd and Commissioners Porter, Farrell, Lee and Tate—safeguarded their reputations by having included in the commission's letter statements showing clearly that, in their opinion, the so-called "rate base" would have no legal standing, and that the Supreme court would hold unconstitutional any decision of the commission to the effect that the railways could be restricted to less than a fair return upon a valuation made in accordance with past decisions of the court.

It is necessary, however, to consider the question from a practical as well as a legalistic standpoint. Prior to 1920, when the Act to Regulate Commerce merely instructed the commission to fix rates that would be reasonable and non-discriminatory, the commission so regulated rates that the general tendency of net return was downward, and, although traffic was growing rapidly, the railways became so unable to raise adequate capital that shortages of transportation became chronic and inflicted enormous losses upon agriculture, industry and commerce.

Transportation Act Not Carried Out

The instructions regarding rate-making given by Congress in the Transportation act were expressly intended to insure that in future the railways would be allowed to earn adequate returns. As the commission says in its letter to Senator Couzens, "Previously there had been no such instructions and, rightly or wrongly, the impression had been created among investors that the commission could not safely be intrusted with such discretion and that some definite statutory measure of protection was needed." The commission admits that the instructions given to it in the Transportation act have not been carried out. It recalls that within six months after the enactment of the Transportation act it granted a horizontal advance in rates that was intended to produce a fair return, but that a depression immediately followed and prevented the intended return from being realized. In 1922 it ordered a 10 per cent general reduction of rates in the belief that this would give "fuller assurance to the carriers of realizing the fair return contemplated by the law." It says that, "In general, the results which followed justified, we believe, the conclusions then reached." Until the beginning of the present depression "the earnings and credit of the railroads in most sections of the country steadily improved," although "the aggregate earnings in the country as a whole and in general in the various groups did not rise to the level contemplated by the statute, even on the basis of our estimates of aggregate value. * * * The continued improvement in railroad earnings and credit, however, was sufficiently reassuring so that we did not feel warranted in initiating or approving any further horizontal increases in rates. * * * There was no * * * anticipation of any serious and prolonged business depression. Such a depression, however, fell upon the country in 1929, and continued throughout 1930 and still exists * * * with the result that aggregate net railway operating income is far below the level contemplated by Section 15-A."

A Chronic Lack of Foresight

From the foregoing recital of experience the only conclusion the commission draws is that it is impracticable to so fix rates that the carriers will earn a fair return in every year. In doing this it merely knocks out a straw man, because nobody ever claimed that rates could be so adjusted that the carriers would earn a fair return in every year. It fails to draw from its recital of experience another obvious and much more important conclusion—namely, that the commission has constantly failed correctly to forecast the changes in those "general economic conditions" which it so solemnly announces, as if it were a new discovery, "must be taken into consideration in the determination of the general freight rate level." In fact, from the time it decided the case for a general advance in rates instituted by the railways in 1910 down to the present time, the commission has invariably over-estimated the return the railways would earn on the rates it has authorized them to charge, and it is mainly in consequence of this that both before and since the Transportation act was passed the railways have constantly failed to

earn a fair return, measured even by the commission's own standards.

The commission's intimation that no such result of its policy as the small return the railways have earned during the present depression could have been anticipated is absurd. It was anticipated by every student of railway affairs excepting the commission. All past experience was a warning that sooner or later such a depression would occur. Over and over again the commission's attention was called to the fact that if it persisted in restricting the railways to return so much less than fair as they earned in the prosperous years 1923-1929 they would be threatened with general bankruptcy if a severe depression came. The present financial condition of the railways would not exist if the commission had not constantly refused to give consideration to this obvious fact.

The rate-making provisions of the Transportation act having completely failed to accomplish their purpose of enabling the railways to earn the constitutional fair return principally because the commission actually has not tried to carry them out, the commission now asks Congress to withdraw its mandate to make rates in a constitutional way, and to give it virtually unlimited discretion to determine the amount of net operating income the railways need and shall be allowed to earn. It concedes, in its letter to Senator Couzens, that previously to 1920 "the impression had been created among investors that the commission could not safely be intrusted with such discretion and that some definite statutory measure of protection was needed." Under the legislation now proposed by it, the commission would have expressly conferred upon it by statute, not only a discretion, but a positive duty, to disregard the constitutional rights of investors. This would hardly give investors any more confidence in its regulation than they had prior to 1920.

Commission a Law Unto Itself

Should the proposed legislation, nevertheless, be passed? The experience of the last quarter century indicates that it will make very little difference in rate-making whether it is passed or not. Under the constitution, as interpreted by the courts, the railways always have been entitled to a fair return. The commission did not let them earn it prior to 1920. The Transportation act specifically instructed the commission to let them earn it, but the commission has not carried out these instructions. In other words, for twenty-five years the commission has persistently refused, regardless of the trends of business and traffic, and of the financial condition of the carriers, to be governed either by the constitution or statutory provisions. It has been a law unto itself, and its regulation has been determined by political influences and the economic views of its members. This will continue to be true in future unless new members of the commission prevent it. The commission has exercised discretion which the law of the land has specifically denied it. It will make no difference in railway earnings or service if it exercises the same discretion under legislation that authorizes its exercise.

There may even be an advantage in giving it by legislation an enlarged discretion and the increased responsibility that must accompany it. Federal regulation of railway rates always has been, and perhaps always will be, a matter of men, and not of laws, depending upon the caliber and economic views of the men appointed to the commission, rather than upon constitutional and statutory provisions. To give to the commission, in bald defiance of constitutional limitations, such power over the earnings of the railroad industry as the commission now seeks would be, however, to give it by statute such a power of life and death over an industry as no government body in this country ever before possessed or even sought. Never before was it deliberately and knowingly proposed to enact a statute giving a government body a discretionary power to deal with private property that was admittedly intended to be exercised regardless of the federal constitution, as interpreted by the Supreme court. Certainly the power to exercise such discretion should only be sought by and given to men possessing complete freedom from political influence, the most judicial temperaments, almost infallible foresight and prodigious ability. Do the present members of the Interstate Commerce Commission possess these qualifications? More than one-half of them have been members of the commission for only two years or less, and therefore it is too early to judge of their qualifications. Men who ask for such power over other people's property should, however, have great confidence in their own capacity.

Changes in existing federal laws for the regulation of railways may hasten the disaster toward which the railways seem to be drifting, but cannot prevent it. The principal thing needed to prevent it is the adoption by the commission of a constructive policy that will help the railways to recover their earning capacity; and there is no feature of the present situation more discouraging than the fact that, in the very teeth of this menacing situation, the commission is advocating legislation that would not only empower but direct it to continue to carry out an unconstitutional and confiscatory policy of regulation.

The commission asks for more power. What it needs is more fairness, brains and courage, or a great deal more use of those that it has. Certainly if the time has come, when, not the constitution, but the members of the commission, are to control regulation, then the time has come when those who want to save the railroad industry from being ruined should begin to fight for the appointment and confirmation of members of the commission who will have and use the ability and courage to regulate the railways with some regard to their welfare and to the public necessity of enabling them to maintain and improve properties and service.

Tourists from Abroad

Progress is being made in the effort to organize a systematic campaign for promoting tourist travel by foreigners in America. Mention has heretofore been made in these columns of the Dyer bill now before Congress which would authorize official effort to attract foreign tourists to these shores. There cannot very well be any serious objections to this bill, so there seems no reason why it should not eventually pass, if those at interest will give it their support. And this category certainly includes all railway men.

Our own tourists travel in great numbers in their private automobiles. Practically all those coming from abroad, on the other hand, are potential railway passengers. How build up this travel? The Bureau of Foreign and Domestic Commerce has just issued a 66-page report entitled "The Promotion of Tourist Travel by Foreign Countries" which gives an excellent summary of efforts made abroad which yields an annual revenue of over 800 millions from American tourists. It is a stimulating report which should arouse the interest of every passenger traffic officer.

Low Bus Taxes a Burden on Small Incomes

The bulk of railway taxes is paid to state and local communities, particularly the latter, and generally in the form of a property tax. However levied, all taxes are one of their costs of doing business, and must be considered in establishing rate levels.

Railway property upon which taxes are levied consists not only of rolling stock but also of roadway and buildings. In fact, by far the greater part of railway property consists of roadway and other permanent structures. The railways, in other words, own all the facilities which they use in doing business. In contrast, the property of highway carriers, upon which taxes are levied, consists almost entirely of rolling stock—motor coaches and trucks—with an occasional garage or station. The greater part of the investment required to conduct highway operations is supplied by the public in the form of improved roads.

"The Motor Bus Tax Burden," a pamphlet issued by the National Association of Motor Bus Operators, states that *general* taxes (as distinguished from special license fees) paid by buses in 1929 equaled 1.30 per cent on their investment, while railroad taxes in the same year totaled 1.53 per cent of property investment. (The Bureau of Railway Economics computation was 1.6 per cent.) According to the bus operators' own testimony, they are paying in *general* taxes on their investment a smaller percentage than the railroads are. But, much more significant, they are paying this smaller percentage upon a very limited investment—an investment which represents only a fraction of the cost of the facilities they use in doing business—while the railway percentage is based upon the entire investment in railway transport. It is plain, therefore, that a comparison of the ratio of taxation on property investment of commercial motor operators with that of railroads is unfair to the latter. The only fair comparison is between the ratios of taxes to gross income of the two forms of transport, after deducting special license fees.

Total bus taxation, *including special license fees,* in 1928, according to the bus operators' publication, "Bus Facts," averaged 7.23 per cent of gross revenues. But, says "The Motor Bus Tax Burden," the proportion of *general* taxes to *total* bus taxes is but 14.5 per cent. Fourteen and five-tenths per cent of 7.23 is 1.05 per cent. This 1.05 per cent, being that part of gross bus revenues representing *general* taxation, special fees for road use being excluded, is the figure which must be compared with the ratio of railroad taxation to railroad gross revenue. In 1928, this ratio was 6.37 per cent.

In other words, leaving out of all account the question of the adequacy of special charges for the use of the highways, and restricting the discussion to the question of taxation for general purposes, the bus operator in 1928 was able to fix his rates on a tax basis of 1.05 cents for each dollar collected, whereas the railway had to base its charges on a tax of 6.37 cents a dollar.

Every small taxpayer knows that it is the city and county which consume most of his tax contributions. A modest householder, with an income low enough to escape the federal income tax entirely, may nevertheless be presented with a tax bill of upwards of $100 on his property. His even less fortunate neighbor who owns no real estate will pay as much in added cost of rent. And of the $100 paid in taxes, $90 will not unlikely go to his city and county and only $10 to the state. To provide tax relief, therefore, for the vast majority of the American people—the vast majority who most need relief—local taxes should be reduced.

Of the hundreds of millions of dollars paid in taxes by the railways, over fifty per cent goes to local communities, and to that extent reduces the tax burdens of those who most need such assistance. Of the taxes paid by motor bus lines, according to the bus association's own admission, only 14.5 per cent goes for general purposes, and the remaining 85.5 per cent they pay "for the use of the highway." Hence, bus lines are contributing paltry hundreds of dollars to the tax receipts of counties and local governments, whereas the railways are paying hundreds of thousands.

No one escapes local taxes. They fall relentlessly on the shoulders of the drought-stricken farmer and the unemployed workingman, whether they own property or are forced to pay rent. By their weight on modest-income groups who form our great consuming population they are a brake on return of better times.

Are the great mass of the American people who pay only state and local taxes prepared to see the latter greatly increased because of the abandonment of railways due to the activities of competitors who make only slight contributions to local tax receipts?

A Coal Train of 8,800 Tons on the Burlington

Building Up Tonnage Trains

Burlington's plans of 30 years ago bear fruit on Beardstown line

WINTER and summer, the Chicago, Burlington & Quincy handles coal trains averaging 8,800 tons over its Beardstown division, making long runs without stops for any purpose, and rendering a valuable service to the mines in the southern Illinois field. The present efficiency of the coal-handling operations may be attributed, in large measure, to the working out of a careful plan that had its inception nearly 30 years ago. This plan was considered an ambitious one at the time and there were many who doubted its possibility. Nonetheless, so sound was it and so well has it been carried out, that, in its fruition, the heavy trains mentioned are operating over a large portion of what is probably the longest low grade line in the country, extending for more than 600 miles from the Illinois coal fields to the Twin Cities.

Certainly the originators of the plan in the days when 300 tons was the maximum trainload on this line and 1.5 per cent grades were frequent, could not have predicted the ultimate peak at which the line would arrive. The fact remains, however, that their plan was sound, and it has been carried to a successful conclusion despite rate difficulties, upheavals in the coal industry, wars and other adverse factors. Each step that has been taken has been toward a more economical handling by increasing the train load.

The average train tonnage supplies a barometer with which to gage the increasing efficiency. From the original 300 tons, this had risen to above 2,500 tons in 1910. In 1920, the Beardstown division, on which the coal originates, hauled an average of 5,250 tons of coal per train from the southern Illinois mines, while in 1929, this average was increased to 8,750 tons. These results were obtained by a practically complete rebuilding and subsequent double-tracking of the line, permitting the efficient use of heavier power, which, in turn, was followed by changes in operating methods to take the fullest advantage of the changed conditions.

Other statistics relating to the Beardstown division bear out the improvement still further. The transportation ratio was 25.92 in December, 1920, and 13.57 in December, 1929, while during the months of heaviest traffic, this ratio is even lower. For example, in October, 1929, it was 12.28.

A comparison of results during the months of heaviest traffic shows the following:

	October, 1920	October, 1929
Loaded car miles	6,144,405	5,316,818
Cars coal loaded	23,518	21,341
Net tons	273,893,600	223,406,000
Net tons per train mile	1,342.7	1,673.8
Total payroll (Road train and engineman)	$73,195	$55,941
Total payroll (Yardmen)	$37,560	$28,230

The Coal Lines

The coal lines include the portions of the Beardstowr division between West Frankfort, Ill., and Herrin, to Bushnell, Ill., and the Galesburg division between Bushnell and Galesburg, at which latter point the coal trains are broken up for movement east, west and north.

These lines have had an interesting history in the course of their development from purely local lines to important coal-carriers, handling also a considerable amount of through business. The Burlington owned a line between Savanna, Ill., and St. Louis, Mo., for years before it decided to enter the southern Illinois coal fields. The first step toward entering the mining territory was made in 1903, by the purchase of the Jacksonville & St. Louis, a bankrupt line, which extended from Jacksonville, Ill., 111 miles to Centralia. During the same winter, a 10-mile connection was built from the north end of the J. & St. L. to the Galesburg-St. Louis line of the C. B. & O. at Concord, 10 miles south of Beardstown, and in 1905, the J. & St. L. was extended south from Centralia to Herrin, 53 miles, and spurs were built to serve several mines. The further extension from Herrin to Paducah was built in 1910, to serve as a connection with the lines south of the Ohio river, although because of the proximity of the Kentucky mines, no coal moves south and this southern portion of the line serves only as a connection for merchandise traffic.

All of the construction north of Herrin had in mind merely an entry into the coal territory, and the fact that the Burlington now had a line of its own into the coal fields did not mean that its problems were solved by any means. There still remained the problem of handling the coal economically, the solution being heavier train-loading than was possible on the existing lines. After a study of the cost of production at the mines, and of the rail-water rates via the lakes, it was found that, to sell the coal on a competitive basis in the Twin Cities, the highest freight rate possible was $2.10 per ton, Herrin to St. Paul, 648 miles, or 3.2 mills per ton mile. The condition of the line was such that the movement could not be handled efficiently at such a rate. In common with other railways of the vicinity, the J. & St. L. and the line of the Burlington to Galesburg were built with frequent grades of one per cent or over, against the northbound movement. Accordingly these lines were reconstructed and by realinement and grade reduction, a low-grade line with a maximum of 0.3 per cent grade was evolved. This was accompanied by a corresponding reconstruction of the line from Galesburg to Savanna, where a junction is made with the Chicago-Twin Cities line of the Burlington, which was already built to an 0.3 per cent grade north of Savanna.

This assisted the movement materially, particularly with regard to train-loading, which began the steady climb that has continued up to the present time. More efficient handling brought more business, so much business, in fact, that it over-taxed the single-track line. Accordingly, a second track was built, with two gaps, from Herrin to Galesburg, most of which was turned over to the operating department in 1917. One, and the most important, of the gaps occurred in climbing out of the Illinois river bottoms a few miles north of Beardstown, where heavy tonnage trains required the use of two helper engines. This was overcome in 1925 by the building of a low-grade cut-off between Frederick and Vermont, 19.6 miles, for the northbound loaded movement, which enabled the handling of the same tonnage north of Beardstown as was being handled south of that point. This cut-off marked the completion of the low-grade Herrin-Galesburg line, 261 miles.

Later developments in the coal rates were such as to prohibit the handling of coal into the Twin Cities from southern Illinois on a profitable basis, even under the increasingly efficient operation. By this time, however, a sufficient business had been developed to Chicago and other Illinois points, and also to points in Missouri, Iowa and Nebraska, and the movement continued to be heavy.

The Coal Movement

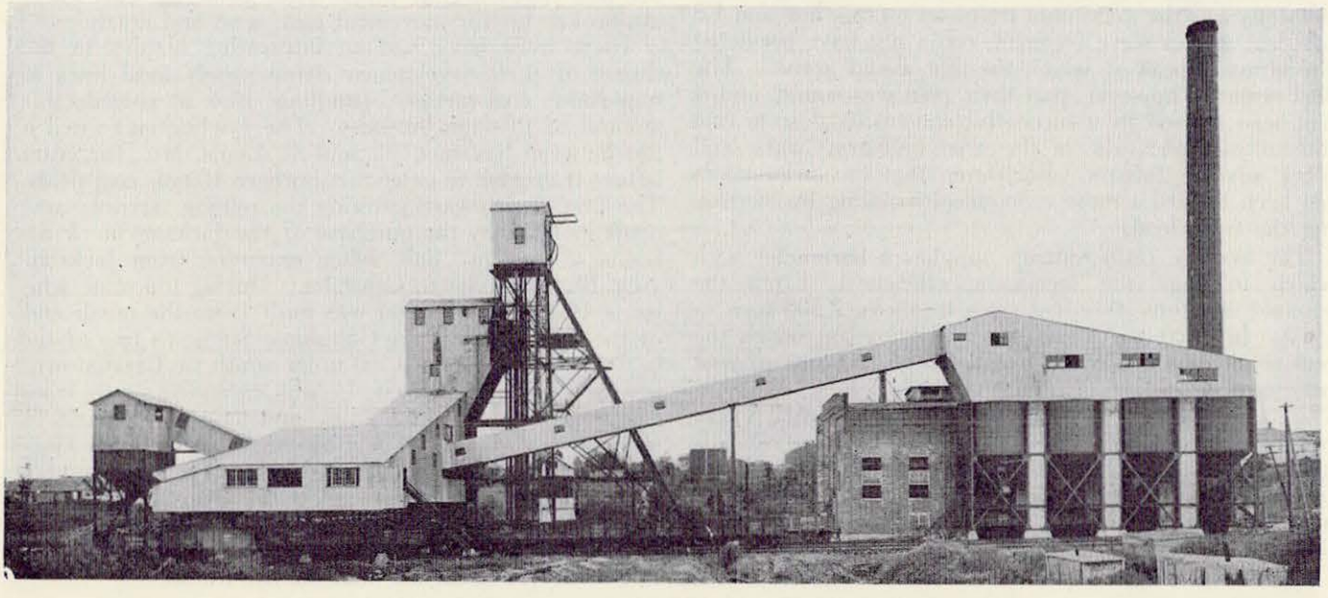
Since the building of the line into the coal fields, the traffic has been built up, dependent largely, of course, upon the fluctuations of the coal industry. The heavier tonnage and elimination of stops permitted a prompt handling that was satisfactory to the shippers. The importance of the coal traffic is indicated by the fact that 92 per cent of the tonnage handled on the Beardstown division originates on it.

The Burlington serves 52 mines in the southern Illinois field. Because of the exigencies of the moment in the coal industry, only such mines as have a low overhead cost are now being operated, and only 26 of the 52 mines are now in active production. Also, the traffic is seasonal, there being summer and winter peak movements, with intervals of light loadings between, the winter movement being heavier than the summer movement. The largest day's traffic in recent years was on March 30, 1927, when 1,570 cars were loaded, while the peak day in 1930 was January 23, when 1,039 cars were loaded.

Mine runs operate from Centralia to the mines, setting out empties and picking up loads, the principal runs of this nature being between Centralia and West Frankfort, 99 miles; Herrin, 104 miles; Christopher, 82 miles; and Ziegler, 94 miles, the mileage given covering the round trip in each instance. Switch engines are operated at each of these points to serve the mine loading tracks and to make up the trains for the run to Centralia. These switch engines average 16 hours continuous service daily. As a result of double-crewing, it was possible, in March, 1930, to close the engine terminal at West Frankfort, these engines now being serviced at Herrin, while the switch engines operating at both Christopher and Ziegler receive enginehouse attention at Christopher.

Coal from the smaller mines is brought in by shorter mine runs, or by local freights, which take merchandise and empties south, and bring back coal trains. The operations are so arranged as to get the coal moving by not later than nine o'clock on the morning following the loading. In fact, much of it is picked up and taken to Centralia during the day on which it is loaded.

The concentration point for this coal is at Centralia, the cars being classified and made up into outgoing trains at the yard there, this yard containing 53 miles of tracks, with a capacity of 2,400 cars. At Centralia, also, the



Loading Facilities at One of the Southern Illinois Mines

empties brought in from the north are separated into 12 classifications before they are moved to the mines. From Centralia, the trains are handled to Galesburg, with a stop at Beardstown yard to change crews and to cut out any bad orders or short loads there may be in the train. This yard has a capacity of 2,400 cars, and it is used principally for the classification of general freight. The crews operate on a turn-around basis between Beardstown and Galesburg, the Beardstown division coal crews operating over the Galesburg division from Bushnell to Galesburg and return.

A run observed on October 8-9 will illustrate the method of operation in detail. The entire run was made with M-4 engine 6326, which left Centralia at 4:20 a. m., October 8, with 121 empties, arriving at West Frankfort at 7:30 a. m. This engine left West Frankfort at 9:45 a. m., with 129 loads, 8,842 tons and arrived at Centralia at 12:45 p. m., making the 49.4-mile trip in exactly three hours, without a stop.

At Centralia, the engine was serviced and departed northbound at 3:20 p. m., with 122 loads, 8,817 tons. The train stopped for water at Litchfield, 56.6 miles, at 6:52 p. m., and departed at 7 p. m., arriving at Virden, 24.5 miles, at 8:15 p. m., where an hour's stop was made to permit the crew to eat and to take coal and water. Leaving Virden at 9:15 p. m., the train ran to Beardstown, 54.5 miles, without further stop, arriving at 12:25 a. m., October 9. There were no bad orders or short loads to set out, and the same engine, after servicing, departed with the same train at 2:25 a. m., arriving at Bushnell, 44.5 miles, at 6:20 a. m., where a stop was made for coal, water and meals. Leaving Bushnell at 7:15 a. m., the train arrived at Galesburg, 29 miles, at 9:30 a. m.

The same engine left Galesburg on the return trip at 11:15 a. m., with 29 loads and 38 empties, 1,920 tons, arriving at Beardstown at 2:45 p. m. It then left Beardstown at 4:45 p. m., with 125 empties, 2,500 tons, arriving at Centralia at 11:15 p. m., thus completing a trip of 513 miles. The running time with the tonnage train from West Frankfort to Galesburg, 255.5 miles, was 23 hr. 45 min. Deducting the necessary delays of 7 hr. 56 min. enroute, the running time totaled 15 hr. 49 min., or an average speed of 16.5 miles per hour. It may be mentioned that, during this entire trip, there was a conspicuous lack of rough handling.

The Motive Power

It will be observed that the same locomotive handled each of the various trains from Centralia to West Frankfort and return; Centralia to Beardstown; Beardstown to Galesburg and return; and from Beardstown to Centralia. The locomotives in this service consist of 18 Texas Type M-4, with a coal capacity of 27 tons, and tenders with a water capacity of 21,500 gal., and 16 M-2 type, with a coal capacity of 20.8 tons and a water capacity of 12,000 gal. The M-4 type locomotives were built after an operating and a mechanical department man were sent together to two widely separated railroads to study heavy tonnage there, and the engines incorporated the best features of design looking toward heavy tonnage handling. The runs as above described insure the maximum utilization of the M-4 locomotives, which were put in service in May, 1929, and have been a potent factor in increasing the tonnage. The effect of these locomotives on train length is indicated by the table, which shows a comparison of the first six months of 1929, before the engines were in general use, and for the last six months of the same year, when their effect was making itself felt.

Number of Freight, Mixed and Work Trains Run on the Beardstown Division in 1929

	First Six Months	Last Six Months
30 cars and under	1,738	1,638
31 to 50 cars	1,807	1,139
51 to 70 cars	1,684	1,551
71 to 90 cars	1,994	1,038
91 to 110 cars	1,996	1,203
111 cars or over	1,241	2,754

These locomotives have a tractive power of 90,000 lb. and weigh 353,820 lb. on the drivers, the total weight of the engine and tender being 897,910 lb.

Eliminating Stops

The coal capacity of 27 tons and the water capacity of 21,500 gal. on the new locomotives have been important factors in eliminating stops, which is of paramount importance if heavy tonnage trains are to be handled efficiently. For example, under normal operations, the 8,800-ton trains run through from West Frankfort to Centralia, 49.4 miles, without stopping for any purpose whatever. This, however, has not been the only factor in avoiding delays.

The Beardstown division, angling across Illinois, encounters an unusual number of crossings with other lines. There are 24 crossings at grade between West Frankfort and Bushnell, 228.5 miles, or an average of one every 10 miles. These are all equipped with interlockers, except three crossings with comparatively light traffic branch lines. Spring switches are also provided at the entrance to the double track and at other places to eliminate stops for throwing switches.

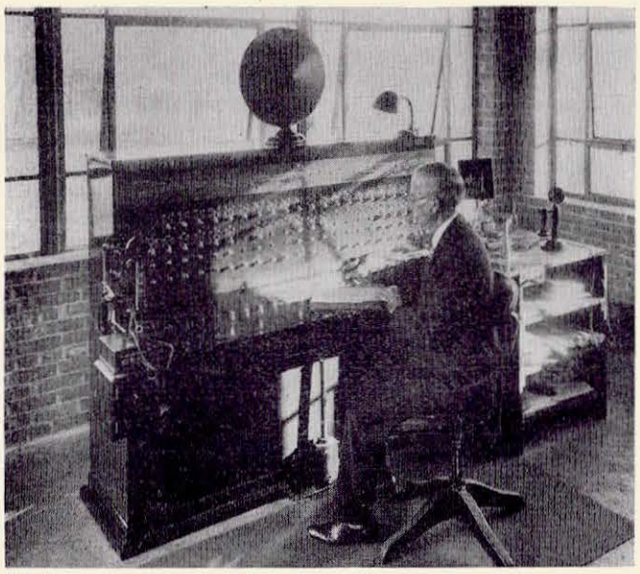
Careful attention is paid to the avoidance of hot boxes, not only by preparation of the empties before they are sent out for loading, but also by a staff of car oilers in the field. A continuing campaign is also being waged against rough handling. That this is successful is indicated by the fact that an average of less than four drawbars a month are pulled out of these trains.

Two first-class trains a day in each direction are operated over most of the territory in which the coal trains operate. These passenger runs are taken care of by rail motor cars, and it is most unusual to stop the coal drags for them, the motor cars being operated against the current of traffic to run around the coal trains, such movements being handled by train order only.

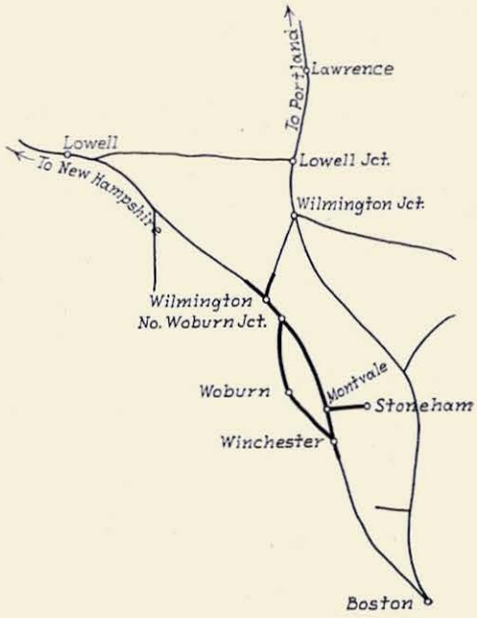
Another deterrent to heavy train loading is the difficulty of operating with full tonnage in the winter time. The deep cuts on the Vermont cut-off, in particular, are trouble makers, since the frost gathers there and remains until late in the morning, thus causing an extremely adverse rail condition, with the result that trains have frequently stalled. This trouble, together with all difficult rail conditions brought about by weather, has been eliminated by a device perfected by the division officers whereby hot water, drawn from the boiler, is sprayed on the rails. This expedient enabled the Burlington to maintain its tonnage rating during the winter without having the heavy trains stalling on bad track.

A superintendent at Beardstown, with an assistant superintendent at Centralia to look after the mine runs, and two trainmasters, supervise the operations. No small part of the uniformly excellent performance results from the fact that no "boomer" is employed on the division at any time, despite the fluctuations in traffic which sometimes make necessary a reduction in force of as much as 50 per cent. The employees, and the officers as well, were all born and raised within 50 miles of the division. When the force is cut, many of the men return to the farms. Also, the industrial situation in the vicinity is such that the outside companies need additional force at the time of the year when the railroad traffic is light. The result is that a trained and experienced force of loyal employees is available at all times on 24 hours' notice.

Centralized Installation on B. & M. Controls Four Junctions



The Control Machine at Winchester



Map with Control Territory Shown Heavy

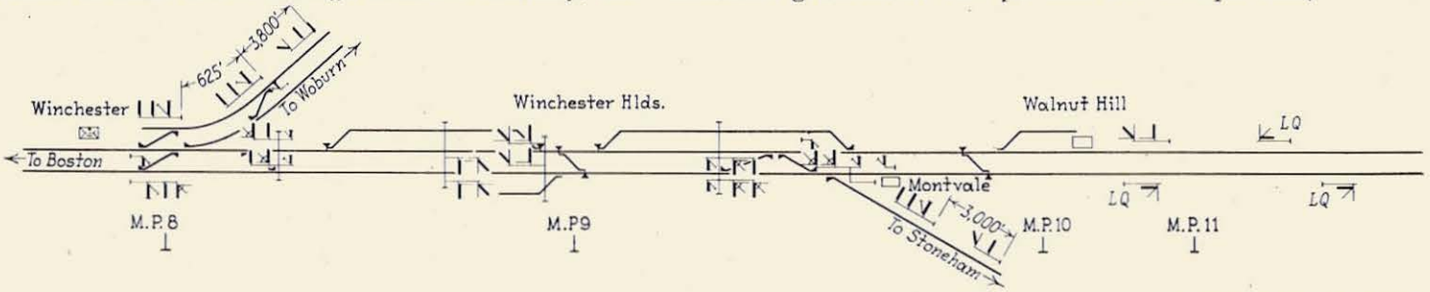
Train movements are facilitated and operating expenses reduced by closing interlockings

By E. N. Fox
General Signal Inspector,
Boston & Maine

IN the vicinity of Winchester, Mass., on the Boston & Maine, three mechanical interlocking plants and one layout of switches, bolt-locked with mechanical ground signals, together with the intermediate semaphore automatic block signals on 17 miles of line, have been replaced by a Union Switch & Signal Co. centralized traffic control signal system. This installation is on a main line of the Boston Terminal division, which connects with the New Hampshire division. Winchester, the southern end of the controlled territory, is 7.8 miles from Boston, while Wilmington, the northern end, is 7.4 miles north of Winchester. Including the approach territory, the new work extends over 10.3 miles of main and 6.7 miles of branch lines.

At Winchester a double-track branch, called the Woburn loop, diverges from the main line, follows a rather tortuous course through suburban territory, and rejoins the main line at North Woburn junction. Two of the old interlocking towers were located at these junctions. The third was at Montvale, 1.9 miles north of Winchester, from which point a single-track branch extends to Stoneham, 2.4 miles distant. A 3.2-mile single-track line extends between Wilmington and Wilmington Junction, to provide a connection from the west route of the Portland division to the New Hampshire route of the Terminal division. At Wilmington, the switches were handled by ground switchmen, protection being provided by ground-operated mechanical signals bolt-locked with the switches.

The topography of the country is that of a typical eastern Massachusetts region of low hills, resulting in numerous curves but no severe grades on the main line, although the Woburn loop and Stoneham branch have maximum gradients of 1.05 per cent and 1.40 per cent,



Track and Signal Plan of

respectively. The main-line track is practically all laid with 100-lb. rail and rock ballast.

Traffic

As the territory is close to Boston, there is a heavy suburban traffic, especially during the morning and evening rush hours. Most of these trains run via the Woburn loop; a few terminate at Woburn, but more run through to either Wilmington or Lowell. Traffic on the Stoneham branch consists of passenger trains during the morning and evening hours, and a local freight during the day. The main line handles the through passenger and freight traffic between Boston and the major part of the state of New Hampshire, most of Northern Vermont, and a considerable portion of the province of Quebec. It forms part of the route traversed by the "Alouette" and the "Red Wing," day and night trains between Boston and Montreal via the B. & M. - C. P.; and the "Ambassador" and the "New Englander," corresponding trains between the same points, running via the B. & M. - C. V. - C. N.

Entrance to the new Boston terminal classification yards is at Mystic junction on this same main line six miles south of Winchester. Accordingly, all through freight trains from the Portland division are diverted at Wilmington Junction to the connecting Lawrence branch and brought in at Wilmington to run through Winchester. Thus, most of the Boston bound freight originating in Maine, New Brunswick and Nova Scotia, delivered to the B. & M. by the Maine Central at Portland, is handled over this line also.

Table Showing Traffic on Ordinary Week Day, Not Including Switching Movements

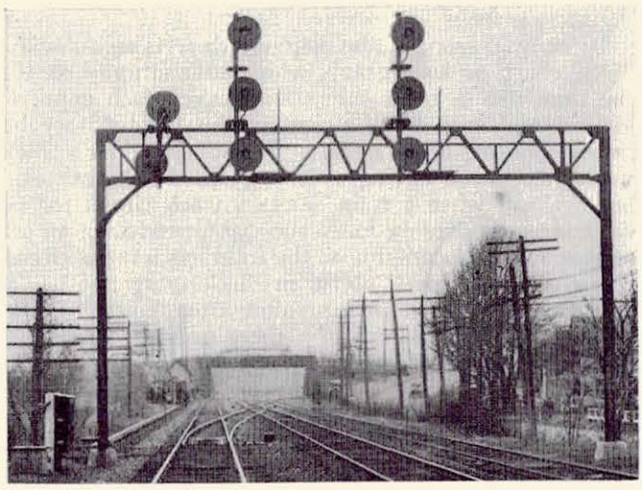
		Passenger Trains	Freight Trains	Total	
Winchester	Main line	38	20	58	
	Woburn loop	44	2	46	104
Montvale	Main line	30	20	50	
	Stoneham br.	8	2	10	60
North Woburn Jct.	Main line	30	20	50	
	Woburn loop	30	0	30	80
Wilmington	Main line	42	16	58	
	Law. br. and eng. house	18	4	22	80

New System of Operation

Certain track changes were made in connection with the new system, such as installing new crossovers to provide for reverse running, and also lengthening some of the existing crossovers. All new main-line crossovers are No. 20, this now being standard on the Boston & Maine; No. 20 turnouts were also installed to replace five existing switch layouts.

As can be seen from the track layout, this installation consists primarily of four interlocking units with signaling provided for either-direction operation on both tracks between Winchester and Montvale, and either-direction operation of the southbound main track between North Woburn Junction and Wilmington, the control of all of these functions being centralized in one machine at Winchester. The control machine is in a new one-story brick tower, located on the station grounds at Winchester, this location being chosen with the thought that eventually the territory might be extended southward to Mystic Junction, in which event the machine would be nearly midway between the two ends.

As the Winchester interlocking is located near the control tower, this unit is operated by a direct-wire remote-control scheme, while the other three interlocking units, Montvale, North Woburn Junction and Wilmington, are controlled by the new U. S. & S. code system. However, the control is all in the one machine, and, so far as the appearance or operation of the machine is concerned, there is no difference between the two



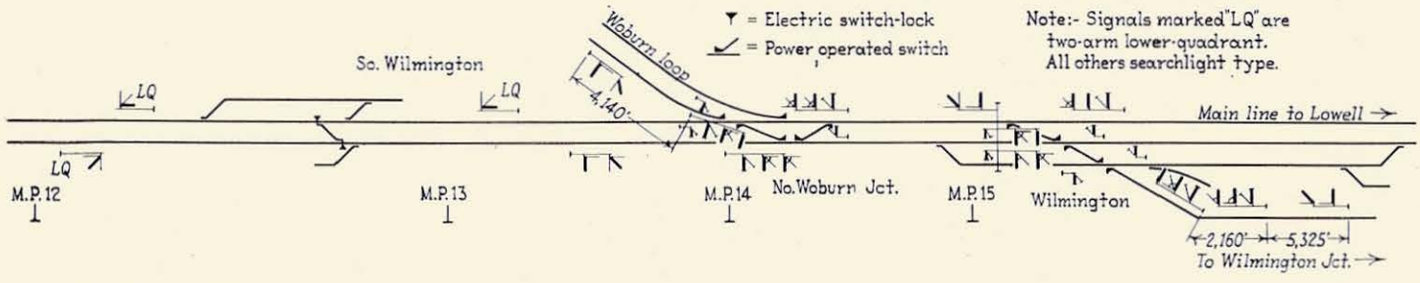
The Signal Bridge at Wilmington

types of control aside from the fact that no "code-operating" or "code-indication" light appears when the Winchester units function.

The vertical panel of the control machine contains, reading in horizontal rows from top to bottom, the track model, the switch indication lights, switch and electric switch-lock levers, the signal indication lights, the signal levers, the "call-on" signal buttons, and the starting buttons.

The apparatus permits selecting between 81 "stations," a station consisting of one switch or crossover, one set of associated signals, a call-on signal, one OS indication, and one approach indication. However, combinations of a greater or less number of stations can be had, if desired. Any lever can be thrown at any time, this being an all-relay interlocking with no mechanical locking whatsoever. The locking formerly provided by locking bars and dogs is now furnished by carrying the proper circuits through various relays in the field. Special circuit precautions are taken to guard against improper operation that might be caused by crosses, grounds, or failure of relays to function.

The operation of this type of machine is considerably faster than ordinary interlockings, inasmuch as it is not necessary to wait for indications on either switches or



Centralized Control Territory

signals. As soon as the towerman has lined up a route and punched out his starting buttons, he can turn his attention to another section of the board, secure in the knowledge that his route will automatically "come in" as soon as conditions permit. Even while a train is still traveling over the switches of one route, it is possible to line up for the next move. The rapidity with which the units operate and indicate is surprising. To reverse a switch, clear the signal over it, and receive the indication back that the apparatus has functioned, requires only six seconds at any of the code locations, irrespective of how many miles away the operated functions may be. The direct-wired units at Winchester act even quicker, taking three seconds.

Directly in front of the operator there is an automatic "OS" chart, or train graph, which automatically records the time that a train enters and leaves each approach section, and each track circuit within the territory between opposing home signals. It is operated by a clockwork mechanism having a driving speed of about 3 in. per hr., and when a train enters a track circuit the recording pen moves ⅛ in. to the right, producing an offset line in that location until the train has left the circuit. The chart has proved useful in checking against late or delayed trains, as well as providing a permanent record.

In the controlled territory, there are three main-line crossovers which ordinarily are used only once or twice a day for movements made by local way freights. It was not economically advisable to operate these from the machine, but electric switch-lock protection has been provided under the control of the towerman. When the use of any of these crossovers is desired, a trainman calls the tower on the telephone, and if the towerman has no conflicting move, he operates a lever on the machine to release the switch. Similarly, there are three switches leading from the southbound main between Montvale and Winchester which are electrically locked by a lever, so as to prevent any train on these sidings from coming out onto the main except under the towerman's jurisdiction.

The train dispatcher for this territory is located in Concord, N. H., 66 miles north of the control station at Winchester. Telephone dispatching is used and the towerman is constantly cut in on the dispatcher's phone line by means of a loud speaker. By following the business over the phone wires, the towerman is kept posted on any irregularity of train movements.

Field Apparatus

Searchlight signals, which are now standard for all new work on the Boston & Maine, were used throughout the installations. For an automatic block signal acting also as an approach signal to a home interlocking signal, a two-light staggered signal is used, the 13-in. stagger telling the engineman that the next signal is a home interlocking signal at which he must see three lights. For bridge signals, all units are mounted above the bottom chord and over approximately the right end of the ties. The type of signal bridge used for the past two years on the Boston & Maine, as shown in the photographs, was carefully designed to produce maximum strength with a minimum of weight.

The switches are operated by electro-pneumatic movements, compressed air being provided by two National Brake and Electric Co. Type SVC compressors at each of the four interlocking units. These compressors are small, requiring only 40 in. by 24 in. floor space, and are 24 in. high. One compressor cuts in when the air pressure falls to 55 lb., and the second cuts in at 45 lb. Each set of compressors with the electrical control equipment is housed in a small portable steel building, roughly 8 ft. by 8 ft. by 8 ft. in dimension.

At the lower left side of the operating panel of the control machine at Winchester four pairs of red and green lights are provided, one pair for each of the four interlocking locations. Normally four green lights are to be seen. If, however, the source of electric power should fail at any location, or if the air pressure should drop to 42 lb., due to both compressors developing trouble simultaneously, the green light for that location will change to red, and the fact will be audibly announced by the single-stroke bell, whereupon the towerman should promptly notify the maintainer. Reserve batteries on floating charge, and storage air tanks provide ample capacity for operating the plant until the maintainer can reach it.

The installation was placed in service in three stages, at intervals of about ten days apart; Winchester and Montvale were first, followed by North Woburn Junction and then Wilmington. The railroad furnished the concrete materials, furnished and installed the insulated joints, rail braces, gage plates, switch timber and track bonding, and did all the pole line work. The storage batteries were furnished by the Electric Storage Battery Company, while the remainder of the material, with a few minor exceptions, was furnished and installed by the Union Switch & Signal Co.

Who Killed 15a?

By Harold F. Lane
Washington Editor, Railway Age
WASHINGTON, D. C.

SECTION 15a, the heart of the Transportation Act of 1920, is dead. Long live the new Transportation Act of 1931, 1932, or 1933, as the case may be! No date has been set for the funeral and Congress has not yet been officially advised of the fact, although Senator Couzens, as chairman of the Senate committee of interstate commerce, was given the information in the letter addressed to him on January 21 by Commissioner Joseph B. Eastman on behalf of the Interstate Commerce Commission.

How soon the commission's recommendations for a successor to 15a may be acted upon is, of course, uncertain, but every day seems to bring closer the prospect of an extra session of Congress, which probably will be avoided but which might afford an opportunity, and at any rate it now seems inevitable that the matter will continue to press for Congressional attention until something is done about it. Congress has not in the past distinguished itself for alacrity in following the commission's recommendations and we believe it took several years to bring it around to the commission's view that there should be a valuation in the first place, but as far back as 1923 the commission made a mild suggestion in its annual report that the valuation act of 1913 (now section 19a of the interstate commerce act) be amended to provide for bringing basic valuations up to date by adding or subtracting net property changes, without the necessity for revaluation from time to time. At that time the commission admitted that such a plan might raise constitutional questions but now a majority of its members think it can get around such questions by proposing to use a percentage return on a rate base only as a "barometer" rather than as a compass. Such a plan should prove rather popular with Congress, especially one with a Democratic-Progressive majority, which will of course be glad to repeal the iniquitous although non-existent "guaranty" of 5¾ per cent.

Of course they will lament the recapture clause, but as it has been almost equally non-existent and as the 1920 Congress carefully fixed it so that it could not well be used, perhaps it will be found that they have not had much opportunity to become attached to it.

The commission's recommendations so far do not seem to have aroused much of a reaction on Capitol Hill, but Congress has its hands fairly full just now trying to show the drought-stricken farmers and the ex-soldiers that Hoover, with all his reputation, is only a "piker" when it comes to distributing relief funds, and it may be some time before it gets around to considering legislation.

Many people will shed a tear for Section 15a, particularly those who have invested their money on the strength of it, although they have had some time in which to prepare themselves for the worst, but when the body charged with the administration of the law says three times in its report that the railroads have never been able, since 1920, to obtain the aggregate earnings contemplated by Section 15a, speaking of a period in which for most of the time circumstances have been far more favorable for its application than the present, it seems rather late to believe it can be revived.

The commissioners were not quite so explicit as to point out that the recapture clause is also, and has been for about a year and a half, just as dead as the rest of 15a, possibly because the House appropriations committee had just recommended and the House has now passed another appropriation of $3,554,368 for valuation work on the ground that the commission might get some of it back by recapture. This failure to report the demise of the recapture clause in connection with the recommendation that it be thrown overboard may have been the reason so many newspapers treated the commission's statement as a proposal for more generous treatment of the railroads hereafter. However, the fact appears to be that the recapture died a violent death on May 20, 1929, the day the Supreme Court of the United States held that "fair value" is something more than an estimate of approximate investment, and it begins to look as if the commission were seeking a place to bury the corpse.

The rate-making rule of Section 15a has shown few signs of life since it was given a short run in 1920, and then abruptly thrown into reverse in 1922, but the recapture clause, although given many more chances to make a name for itself and even to show its teeth on numerous occasions, has actually attempted to use them but once, in the O'Fallon case. And it turned out then that they had tried to bite off more than they could chew.

It is true that the recapture clause once received the blessing of the Supreme Court as one of the instruments through which the Interstate Commerce Commission was to exercise its "fostering care" over the railroads, but that was before it had even shown its teeth, although the Dayton-Goose Creek Railway had been led to believe it intended to. Also a number of other roads, either convinced of its benevolence or afraid of the teeth, have paid over some $10,000,000 to the commission under protest.

Congress had begun to lose some of its interest in the valuation on which the commission has been engaged since 1914, and for which it has now appropriated some $39,000,000, when its attention was called three or four years ago to the vast possibilities of recapturing several hundred thousand dollars of alleged net income above 6 per cent on the still nebulous valuation. The valuation appropriation was boosted back to about three million dollars annually again and much of the money devoted to bringing up to date the valuations of a list of 298 railroads that in some one year since 1920 had apparently succeeded in earning more net than the average road. Some one in the commission's organization estimated at one time that $254,000,000 might be recovered from these roads, with adequate appropriations. It now appears that the estimate was made on the O'Fallon basis, and under the influence of another estimate that the Supreme Court was becoming weary of reiterating that it is the value of a property, not the dollars originally expended to produce it, that is of interest, and that the court was about due to change its mind.

Since then the commission has made public a lot of tentative or proposed recapture reports, by its Bureau of Valuation or by Division 1, attempting to comply with the court's decision by giving 50-50 weight to estimates of original cost and of reproduction cost, both less depreciation, but the commission has not yet passed on them. Some of these reports were apparently hurried up because the roads had been abandoned after having their profitable year or so, and there was some fear that the assets might be dissipated, while in other cases the excess of one or two years might be consumed in meeting later deficits.

Presumably the commission will have to decide something on these reports before Congress gets around to acting on its recommendation that the law be repealed because it has not been able to raise rates high enough to produce much excess income unless the courts will let it hold down the value. Of course, if the value is held down sufficiently, there will be no particular occasion for having a recapture fund, especially as no one seems to have much idea what to do with one under the existing law.

If anyone wants to know who killed Cock Robin a plausible argument might be made out to the effect that this very recapture clause did so while committing suicide itself.

Recapture was proposed in the first place to make it easier for Congress to swallow what then looked to some like a "guaranty" in the rate-making rule, although some visualized it as an equalizer. Then there was the idea that recapture would soon disappear within the consolidated systems into which the strong roads were to absorb the weak. But when the commission found itself unable either to formulate an ideal consolidation plan of its own or to approve some of those proposed by others, and also convinced itself that rates made to comply with 15a would not be "reasonable," but still insisted on enforcing the recapture clause, which did not include the words "as nearly as may be," the latter assumed a self-importance under which it seems to have swelled up and burst, because recapture seems to require new valuations each year.

The new rule of rate-making proposed by the commission, although undoubtedly representing distinct progress as compared with that of the Howell bill, seems capable of being boiled down to a direction to make the "lowest possible rates consistent with adequate transportation service," sufficient credit for the railways being considered necessary to the attainment of that end. This is not much different from the language in the Hoch-Smith resolution which told the commission to try to go easy on the farmers, but which the Supreme Court held meant no more than the rule of Section 1 that rates shall be just and reasonable. The commission is to keep before it, possibly on the wall of its conference room, a barometric record of the percentage earned on the rate base, which it is to observe from time to time over a period of years, adjusting the percentage, perhaps, as even a barometer must be corrected for temperature,

but not necessarily regarding it as a "reason for raising or reducing rates."

It is understood that the commission has, at least for some years after 1920, maintained such a barometric record, for its own information, of the monthly percentages earned on its tentative valuation of 1919 as adjusted for later additional investment, and that these percentages have ranged something like one-half of one per cent above the monthly figures published by the Bureau of Railway Economics based on property investment. Even on this basis the roads as a whole have never attained 5¾ per cent while the roads and the commission have failed to agree as to what rates should be raised or lowered.

The original Howell bill has almost passed out of the picture, its only remaining advocate being Donald R. Richberg, who is understood to have written it, but the commission has set up something in its place that will certainly have to be reckoned with sooner or later, particularly as it comes so close to representing the views expressed by the National Industrial Traffic League and the state commissioners' association. For this reason there has been much speculation as to how much the commission's suggested plan would change the situation that has existed for many years.

In an address in January, 1920, while the transportation act was still under consideration, Director General Walker D. Hines said: "I believe there must be a definite standard by which the reasonableness of the general rate level can be measured. In the past there has been no appreciable standard. Plausible arguments could be made against any increase that was sought under any conditions. The rate-making body had to take all the responsibility and odium of creating a standard as well as applying it. In my opinion Congress itself should establish a general but workable standard and leave to the rate-making body the application of this standard according to the facts."

Undoubtedly that was the general idea behind the adoption of Section 15a in the minds of all of its "wishful thinking" advocates. Yet the law as passed left to the commission not only the duty of passing upon the reasonableness and discriminatory character of rates as before but it left to it the duty of prescribing the percentage and the valuation which were to govern it in adjusting rates, and did not say specifically whether its percentage was to be a maximum or an average.

Apparently the commission would now prefer the "odium and responsibility" to which Mr. Hines referred to that which might have come to it if it had ever taken Congress at its word.

However, the question still remains as to whether that would have caused it any more criticism than would a suggestion on its part that its barometer should show, say, 7 per cent, on the rate base. And while some railroad officers may object to swapping 15a for such a plan as its substitute without some Congressional direction as to what the barometer ought to be expected to show, others undoubtedly would prefer the general language proposed without any reference in the law to a percentage or a rate base which they would consider too low. In other words, if the rate base is to be considered an important factor they would want to be certain that it is high enough, and if it is not to be so considered why have one at all?

THE CHICAGO & ILLINOIS MIDLAND has proposed to take over that portion of the old Chicago, Peoria & St. Louis between Springfield, Ill., and Lock Haven provided no one else wants the road and if money is available to take up deeds for land.

M. P. and L. & A. Joint Trackage Rights

A HEARING before representatives of the Interstate Commerce Commission on the application of the Missouri Pacific and the Louisiana & Arkansas seeking approval of a trackage contract involving 130 miles of line and a bridge across the Mississippi river at Baton Rouge, La., was held in that city on January 27 to February 3. The contract provides for a joint use by the M. P. and the L. & A. of the latter's tracks between North Baton Rouge and New Orleans, for the joint use of the L. & A. and the Texas & Pacific of the latter's lines between Torras and Anchorage; for the joint use by the M. P. and the T. & P. of the latter's lines from Ferriday through Torras to Anchorage; for the joint construction of a bridge over the Mississippi river at Baton Rouge by the M. P. and the L. & A., the former paying two-thirds of the cost and the latter one-third; for authority to operate a ferry service in lieu of the bridge in case of any difficulties in bridge construction; and the joint use of such lines as may be necessary for the complete interchange of traffic.

One of the first witnesses to take the stand was L. W. Baldwin, president of the Missouri Pacific, who testified that New Orleans is the natural outlet for the traffic of a large area of the Mississippi valley, most of which is served by the Missouri Pacific, and that he saw no practical method of acquiring industrial properties and building up industries along the lines in New Orleans under present conditions. He also stated that subsequent to acquiring the Gulf Coast Lines, the M. P. had made a study of a better entrance into New Orleans and as a result of these studies was convinced that the road would be justified in building a bridge at Baton Rouge and a line from Baton Rouge to New Orleans and thereby reduce the amount of business which must be handled over the car ferries at Goulds-boro and at the same time reduce the distance into New Orleans from all points on the M. P. The plan, he said, will result in a much more expeditious delivery of local, export and coastwise traffic through the Port of New Orleans with a possible saving of as much as 24 hr. and will greatly reduce the terminal expense in that city.

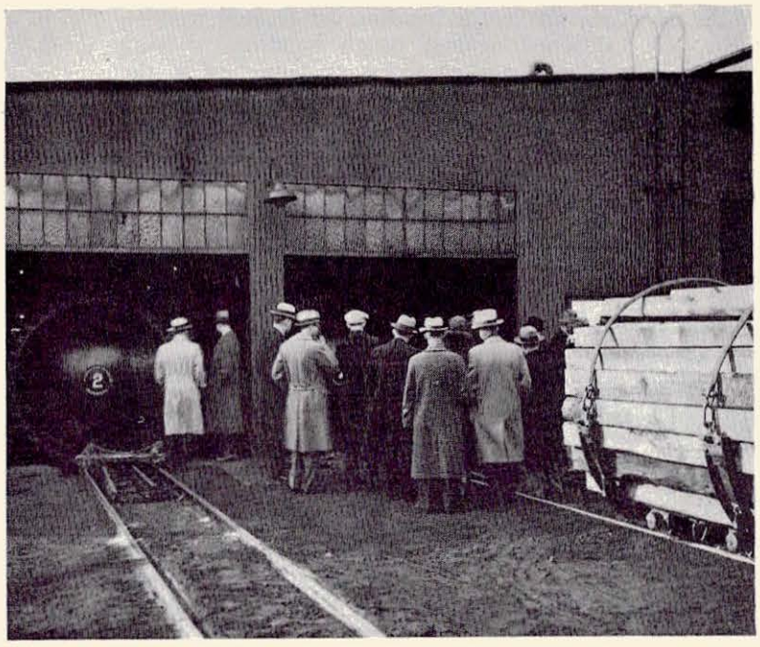
Huey P. Long, governor of Louisiana, stated that approval of the contract is necessary to the welfare of the state's rail, vehicular and water transportation. He said the combination of the L. & A. and the Louisiana Railroad & Navigation Company has been of considerable value to the state, but there is now a growing problem of maintaining these roads. The territory through which these roads pass, he continued, is largely cut-over land, although they traverse some of the river bottom lands and in order that the L. & A. can continue to exist, help must be secured. He also stated that if the L. & A. is not permitted to enter into the contract, which makes available a bridge for $2,500,000 and provides half the cost of improving its lines from Baton Rouge to New Orleans, it will have to put up the whole $7,500,000 for the bridge and improve its lines itself or go out of business and leave a large portion of the state without railroad facilities.

H. C. Couch, president of the L. & A., testified that the provisions of the contract are necessary for the development of his road. The arrangements, he said, will enable the L. & A. to finance its property on more

(Continued on page 332)

Giving Permanency to Timber

Wood preservers note progress in increasing life of ties and other wood in railway service



Approximately 100 Members from the West Inspected the Green Spring, W. Va., Plant of the Baltimore & Ohio En Route to the Convention

THE outstanding progress which the railways are making in giving to timber a life that entitles it to consideration as a permanent construction material was shown in several papers presented at the twenty-seventh annual convention of the American Wood Preservers' Association at Philadelphia, Pa., on January 27-29. Of special interest were papers on Twenty-One Years' Experience with Treated Ties on the Lehigh Valley by C. B. Musselman, chief treating inspector of that road at Bound Brook, N. J.; on The Diversity of Use of Treated Timber, by R. S. Belcher, manager treating plants, Atchison, Topeka & Santa Fe, Topeka, Kan.; and on The Use of Treated Timber in Construction, by F. O. Dufour, consulting engineer, United Engineers and Constructors, Inc., Philadelphia, Pa. The first and last of these papers are abstracted below while that by Mr. Belcher will appear in a following issue. The meeting was largely attended, the registration approximating the previous high record. C. C. Cook, maintenance engineer, Baltimore & Ohio, Baltimore, Md., presided over all sessions as president of the association.

At the closing session of the convention John S. Penney, vice-president, T. J. Moss Tie Company, St. Louis, Mo., was elected president; Elmer T. Howson, western editor, *Railway Age*, Chicago, first vice-president; R. S. Belcher, manager treating plants, Atchison, Topeka & Santa Fe, second vice-president, H. L. Dawson, secretary-treasurer (re-elected), and F. C. Krell, forester, Pennsylvania Railroad and R. S. Manley, president Texas Creosoting Company, Orange, Texas, directors.

Shortly after calling the convention to order, Mr. Cook summarized the work confronting the organization in the statement that a "reduction of supply in woods of superior quality necessitates refinement of action in the preparation and treatment of the kind of timber next found most durable. In treated timber, relative durability is not inherent alone in the structure of the wood. Seasonable cut, proper seasoning and right treatment may easily render woods relatively inferior and of a less desirable grade more serviceable than other normally more-durable timbers which have been subjected to less intelligent treatment. And the exhaustion of these superior woods does not cause alarm in the knowledge that the art of handling and treating timber is thus wisely developed and improved to the end that relatively inferior woods are made to give equal and even superior service and economy."

Many Subjects Discussed

The program included many reports devoted to refinements of treating practices intended to increase the thoroughness and reliability of treatment. Of special interest was a report presented by the Preservatives Committee on high residue creosote oils, dealing with a problem that is giving serious concern on certain roads which are using creosote-petroleum and creosote-coal tar mixtures. This report traced the changes that have occurred in the amount of residue in creosote oil as the proportion of domestic production has increased and indicated that exhaustive studies will be undertaken to ascertain the relation between the oils used heretofore and the service life secured from timber so treated. Believing that high-residue oils are less toxic, several roads have recently introduced into their specifications provisions restricting this residue. The proposed study is to determine the necessity for this action.

A Committee on the Processing of Wood, headed by A. W. Armstrong, president Ayer & Lord Tie Company, Chicago, was concerned primarily with the fireproofing of wood. As a result of investigations indicating that many problems in this field still remain to be solved, the committee on June 10, 1930, recommended to the Executive committee of the association the initiation of a general research in this field. Plans for financing this undertaking are now being considered in collaboration with the National Lumber Manufacturers' Association.

In a brief report, the Committee on Posts, of which Frank McCrory, chief tie inspector of the Chicago, Rock Island & Pacific, was chairman, called attention

to the need of care in the handling of treated wooden posts. It cautioned against rough handling, driving them in the ground and unnecessary pounding in the application of staples. While it suggested that dry vegetation should not be allowed to accumulate around them, it also presented evidence to show that ordinary grass fires do no harm, even if repeated year after year. Among the other reports presented were those dealing with the pressure and non-pressure treatment of poles, pole service records, preservatives and a brief initial report of a newly formed committee on Bridge and Structural Timber. The latter committee outlined a program for the compiling of data on the service life of treated wooden bridges and similar structures. It also submitted instructions for the handling of treated bridge material in the field.

J. D. McLean, senior engineer, Forest Products Laboratory, Madison, Wis., presented a paper on experiments which have been in progress since 1911 on the effect of various preservatives and treatments in increasing the resistance of woods to attack by marine borers. The work consists largely of tests carried on in Gulf waters in co-operation with the Louisville & Nashville and the Gulf & Ship Island.

Meet Obstacles in Treatment of Car Lumber

The Committee on the Treatment of Car Lumber, headed by J. R. McGrenera, general tie and timber inspector, Atchison, Topeka, & Santa Fe, presented a report that outlined some of the obstacles in the way of efforts to promote the use of treated wood in car construction and repair. The committee recommended that a committee be appointed, of sufficient size that it may be divided into sub-committees, each to be assigned one class of equipment for study.

Instructions should specify that sufficient time should be taken by each sub-committee, in conjunction with the Mechanical division of the American Railway Association, and with committees of other associations concerned, to set up a list including every item of wood now used in car construction. After due consideration has been given to the durability of untreated members and the possible contamination of lading if non-durable members are treated, recommendations should be made as to which members can or should be treated, the preservatives to be used, and the methods by which they should be applied.

By the time this investigation is completed most of the wooden-framed cars should have disappeared. However, there should be many old cars of practically wooden construction still in service, requiring posts, braces, nailing stringers and fillers, all of which, in some classes of equipment, could be treated with some preservative to advantage. Therefore, the committee recommended that the association sponsor open-tank, brush or spray treatment for such members, because at the present time the lack of pressure-treating facilities adjacent to car-repair shops, is preventing many interested roads from using any sort of treatment. Some roads are now using paint and other agents in unsuccessful attempts to lengthen the life of wooden members that decay in spots, but they do not feel warranted in spending the amount necessary to treat the entire member.

Report on Tie Service Records

The Committee on Tie Service Records, of which W. R. Goodwin, engineer of wood preservation, Minneapolis, St. Paul & Sault Ste. Marie, was chairman, presented an extension of its table of annual tie renewals on 27 representative roads. This table is presented in summarized form below. Tabular reports were presented also relative to test tie track sections on eight different railways.

Road	Renewals per Mile of Track 1929	Five Year Average
A. T. & S. F.	165	135
B. & O.	152	177
C. B. & Q.	159	156
C. & E. I.	120	112
C. C. C. & St. L.	91	108
C. M. & St. P. (Eastern lines)	282	248
C. R. I. & P.	151	146
D. L. & W.	79	92
G. N.	212	209
I. C.	212	189
K. C. S.	152	141
L. V.	48	74
M. C.	102	135
M. K. & T.	216	229
C. I. & L.	125	124
N. Y. C. (East)	140	158
N. Y. C. (West)	74	91
N. P.	146	152
Penna.	143	174
M. St. P. & S. S. M.	236	278
S. P. (Atlantic System)	206	224
S. P. (Pacific System)	191	217
U. P.	150	186
C. R. R. of N. J.	79	86
Reading	135	161
M. P.	260	274
C. & O.	183	249
Average—27 railways	170	180

The Use of Treated Timber in Construction

In a paper tracing the ramifications of the present and possible future uses of treated timber, F. O. Dufour, consulting engineer, United Engineers and Constructors, Inc., Philadelphia, Pa., pointed out the large savings in timber acreage effected by the preservative treatment of wood. In 1907, he pointed out, approximately 25,000,000 acres were required to produce the cross-ties purchased, whereas in 1927 only 17,000,000 acres were required, or some 8,000,000 less acres than in 1907. This decrease was due very largely to preservative treatment, which resulted in the increased life and service of the used ties.

The annual production of material which could be creosoted is approximately 42,000,000,000 board feet, of which lumber and sawed ties comprise 90 per cent and hewed ties 5 per cent. A large portion of the lumber is used for purposes where it is unnecessary or uneconomical to treat it. Yet since the total of timber treated in the United States in 1929 was 4,400,000,000 board feet, or about 10 per cent of that possible, it is evident that there is abundant opportunity for a substantial increase in the use of treated timber.

That the use of treated timber other than track ties is on the increase is indicated by the fact that one large railroad used 42,000,000 board feet last year, or 46 per cent more than in the previous year. Two large systems used about 60,000,000 board feet for purposes other than track ties in 1929.

A great advantage of a treated timber structure is that it can readily be added to or remodeled and in case it becomes obsolete the salvage value is high. The use of wood also allows work in low temperatures without special provision. The disadvantages are in the case of some treatments, odor, liability to soil objects coming in contact with it and difficulty in retaining a presentable coat of paint. The odor has never been very objectionable, soiling can be taken care of by encasement or veneering and some success has been had with special paints; so that it is probable that the problem will be solved.

Large quantities of creosoted timber are used for trestles, both open and ballast-deck, and the field has not been much more than scratched. There are a number of trestles now in use on various railroads that have

been in service from 24 to 30 years and have required little or no maintenance except that due to strengthening on account of increased loading. The deterioration due to decay has been small, and much of this decay has been caused by conditions due to overloading. Even this has been confined mostly to the caps crushing. Ballast-deck trestles and ballast-deck steel bridges offer a wide field for the increased use of treated timber. Treated timber culverts have been in use for 28 years and have shown no sign of deterioration except a little decay at the end of the stays which had been sawed off in the field and not properly treated.

The Lake Pontchartrain trestle of the Southern railway, which is of treated timber, has been in service for 48 years in a sub-tropical climate with an annual rainfall of 56 in., where untreated timber usually lasts less than 4 years. Yet, less than 3 per cent of the original material has been removed from the structure because of decay. In 1911 the structural engineer of the Valuation division of the Interstate Commerce Commission estimated the remaining life to be 35 years and the total life 73 years. It is the belief of the speaker, who has inspected a great number of treated timber structures, that with the methods of treatment and care in handling and construction that we have today, properly treated timber, other than track ties and structures subjected to considerable abuse from overloading, will have a life of from 50 to 75 years.

The decision as to whether to use treated timber is an economic one. The season of construction, the construction schedule, the design, the location, the use to which the structure is to be put, the life of the structure, the salvage value, the ease with which the capacity can be increased, and indirect costs as well as the direct cost and the maintenance, are some of the more important factors to be considered.

Why Tie Renewals on the Lehigh Valley are Small

In 1929, the tie renewals averaged 48 per mile of all tracks. It is estimated that the corresponding figure for 1930 was about 58 ties. This enviable record is not the result of accident, but represents the consequence of a consistent policy of tie conservation which has been observed for 21 years. The practices of the Lehigh Valley, that were responsible for these results were reviewed in a paper presented by C. B. Musselman, chief treating inspector of that road, which is abstracted below.

In 1909 the Lehigh Valley signed a contract for the preservative treatment of its track ties, switch timbers, bridge ties and other forest products. During the period from 1909 to 1919, straight creosote oil, principally foreign oil, was used. From 1919 to 1924 a solution of 80 per cent Grade 1 creosote oil, and 20 per cent coke-oven coal tar was used in the treatment of all material except piling and bridge ties, which were treated with straight creosote oil. From 1924 to the present time we have used a solution of 70 per cent Grade 1 creosote oil and 30 per cent coal tar in the treatment of the major portion of our ties, switch timbers, bridge ties and other lumber. For our oak and pine piles we use a solution of 85 per cent creosote and 15 per cent tar for the oak and an 80-20 solution for the pine.

We have learned by experience that several important factors other than the preservative treatment enter into the question of the service expected and obtained from treated ties and other treated timber. If the inspection of the untreated ties is slack, no treatment or preservative will correct this fault. Treated rotten ties may have all the outward appearances of first-class treated ties, when as a matter of fact at least half of the years of expected service has been destroyed by decay. During this 21-year period, we have maintained a high standard of inspection and will continue to do so. It is not good practice to leave ties piled along the right-of-way for any great length of time after they are inspected. We make it a practice to inspect all right-of-way ties very soon after they are delivered and insist that they be loaded and shipped to the treating plant on the day of inspection or within a week thereafter.

What Kind of Wood?

During the time we have been using treated ties, we have tried to base and regulate our purchases as to the kind and size on the results obtained from treated ties in service. We found that blight-killed chestnut did not produce a tie that would give the expected service; that hemlock ties did not take treatment readily; that ash and hickory ties checked and split badly both before and after treatment; and that the service obtained from such hardwoods as beech, birch and maple did not average up to that obtained from ties made from mixed oak and sap pine. With these facts at hand and considering the greatly reduced number of ties required per mile for proper track maintenance, we believe we are justified in limiting our present purchases to ties of oak and pine. By doing this we expect further to increase the years of service above the average we are now getting from our treated ties.

We also place a limit on the sizes purchased. At present on an order for main-track 7-in. by 9-in and 7-in. by 8-in. by 8-ft. 6-in. ties, we accept only 15 per cent of 7-in. by 8-in. ties, and for side-track and yard work requiring 6-in. by 8-in. and 6-in. by 7-in. ties, we accept only 15 per cent of 6-in. by 7-in. ties. We endeavor to use the amount of preservative that seems to offer the proper protection from decay, and to a certain extent we base the quantity of preservative on the expected years of service. In many cases we treat both ties and other materials to refusal.

Many Factors Affect Life of Ties

The service life obtained from treated ties is controlled to a great extent by the other track materials and by the track maintenance methods. There is no question but that the track structure must keep in step both as to size and quality with the advances made in transportation equipment. During the last 21 years we have made many changes in the strength of our track, and have made many improvements in our methods of track maintenance. In addition to using ties that average larger in size, since 1914 we have been using 20 ties to each 33-ft. rail as compared with 18 previous to that time.

Early in 1916 the 136-lb. rail was adopted for use on main tracks and this weight of rail has continued in use to the present. Since 1925 the standard tie plate for our 136-lb. rail is a canted double-shoulder plate, 8 in. by 13½ in. by 29/32 in. In 1927 we adopted a canted plate 7 in. by 10⅜ in. by ¾ in. for 100 and 110-lb. rail. The switch plates have been changed in type and increased in size from time to time. Rail anchors are extensively used on all main tracks.

For a number of years the demand for ties was met entirely by local purchases along the right-of-way. Over 90 per cent of these ties were sawn and for that reason we had little use for tie-adzing equipment. Owing to the rapid changes and variety of sizes of tie plates and rail in use, we were of the opinion that pre-boring the ties had little if any value from a track maintenance point of view. We are well aware of the fact that preboring does have a great value in so far as treatment is concerned, and as over 90 per cent of the ties now purchased are hewed, we are adzing and boring all of our ties before treatment.

During the period from 1910 to 1930 inclusive, we treated the following number of the various kinds of ties, all of which were furnished under our own purchase and inspection:

Southern pine (sap pine)	5,771,261
Hardwoods (mostly beech, birch and maple)	1,125,160
Oaks (red, white, chestnut, etc.)	1,691,506
Chestnut	101,934
Hemlock	11,655
Ash	8,021
Tamarack (Canadian)	1,600
Total	8,711,137

Of the 8,711,137 ties treated since 1909, all but 181,364 have been placed in service. Of the total number of ties treated, less than one per cent could have been classed as suitable for use untreated. I can say without fear of contradiction that the average service of the entire 8,711,137 ties would not have been more than five or seven years, if they had been used untreated, as compared with an expected service of from 25 to 35 years or more for treated ties.

Reduction in Tie Renewals

During 1910 the total tie renewals per mile of track on the Lehigh Valley amounted to 177. The tracks in that year were

laid with as good a grade of untreated ties of white oak, rock oak, live chestnut and southern heart pine as was then obtainable. However, from 1910 the crosstie renewals per mile of track grew steadily in number, reaching a requirement of 289 ties in 1915. In the years following 1915 and up until 1929 there was a steady decline in the number of ties used per mile, reaching the unusually low figure of 48 in 1929 and the relatively low figure of about 58 ties per mile for the year just ended. To put it in other words, the tie renewals in 1929 were about 27 per cent of the 1910 requirements and about 17 per cent of those of the peak year 1915. The renewals for the year just ended were slightly under 20 per cent of the 1915 requirement.

The great reduction in the number of ties required for the yearly renewals has made it possible to make a like reduction in the number of treated and untreated ties carried in stock. In our case, the stock of treated ties has been reduced approximately 200,000 ties. With treated ties costing about $2 each, this means a reduction of $400,000. It can readily be seen also that the cost of labor to install 48 ties per mile should not be much more than 17 per cent of the cost of placing 289 ties, and for 58 ties per mile it should be about 20 per cent of the 1915 cost.

The installation of new ties in rock, sand, cinder or gravel ballasted tracks always means more or less follow-up work to get and keep the tracks in a first-class condition. The amount of roadbed disturbed per mile of track, based on the use of 3000 ties per mile is about 9.6 per cent for the installation of 289 ties, as against 1.6 per cent for the installation of 48 to 58 ties per mile. The use of treated ties, therefore, reduces the cost of track maintenance from that angle.

The following results show what we have obtained from the use of treated ties and timbers, coupled with improved labor-saving apparatus and improved methods of track maintenance. In 1918 the man-hours required for maintenance work were 11,629,549; in 1928, 5,675,413; in 1929, 5,590,042, while the man-hours for 1930 will be under the 1929 figure.

Motor Transport Hearing at San Francisco

FURTHER testimony showing the effects on railway earnings of motor vehicle competition, the desirability of regulation of interstate motor vehicle operation, and the means by which the railways are attempting to meet motor vehicle competition, was taken by the Interstate Commerce Commission at San Francisco, Cal., January 27-28, at the scheduled hearing under Docket 23,400, Co-ordination of Motor Transportation. The hearing was conducted by Examiners Leo J. Flynn and Albert E. Stephan.

Paul Shoup, president of the Southern Pacific, was the first witness. Describing the large decrease in railway revenues, he said that the causes were the increasing use of private automobiles, the increase in the number of motor coaches and motor trucks operated, the increased tonnage moving through the Panama canal, and governmental development of inland waterways. Mr. Shoup estimated that 25 per cent of the decrease in Southern Pacific earnings has been caused by the competition of motor coaches and trucks. He contended that the railways should be permitted to engage in any type of transportation, and that motor carrier companies should be regulated in the same way as railways and should be subjected to the same rules. Mr. Shoup said that the Southern Pacific desires to co-ordinate railway and highway transportation, and to accomplish this purpose has established a service for freight which involves pick-up and delivery by motor truck and intercity movement by rail.

C. R. Harding, assistant to the president of the Southern Pacific, testified that he is also a vice-president of the Pacific Greyhound Lines, a motor transportation company in which the Southern Pacific owns a one-third interest. In order to meet motor vehicle competition, he said, the Southern Pacific has established reduced rates between certain points; but the rail carriers cannot maintain efficient service under present conditions, and uncertificated motor lines are menacing the regular motor vehicle lines as well as the railways. In response to questions of Examiner Flynn, Mr. Harding said that he considers combined train and bus service desirable. He testified that train service is uniformly faster than motor coach service between such points as Portland and San Francisco, and Los Angeles and El Paso, Tex. Mr. Harding said that he expected motor coach traffic to increase, and that any decrease in motor coach traffic during the past two years has been due to business depression. Frequently recurring rate wars between railways and motor coach lines have invariably resulted in victories for the highway lines, Mr. Harding concluded.

W. A. Worthington, vice-president of the Southern Pacific, said that the railways have lost to the highways not only a large part of their local passenger traffic and l.c.l. traffic, but also a substantial amount of long-haul passenger traffic, carload freight traffic and express traffic. Mr. Worthington introduced a chart showing the decline in passenger, express, and l.c.l freight revenue per mile of road between 1921 and 1930. He estimated, that if the present rate of decline continues, the Southern Pacific in 1935 will have lost $6,625 per mile of road, or $60,453,000 for the 9,125 miles of road operated. The net operating income of the Southern Pacific in 1930 exceeded that in 1921 by only $1,422,000, in spite of an increase of $375,000,000 in investment in road and equipment and a population increase in California and Oregon of 57.1 per cent. During 1929, the franchise motor carriers in California, with an investment of $32,209,000, had gross revenues of $25,715,000, including $9,233,000 freight revenue. Of the 501 highway carriers reporting to the California commission, 71 transported passengers; 251, property; and 179, both passengers and property. Mr. Worthington said that only a small part of the highway freight traffic is handled by certificated carriers, the bulk of it being moved by contract carriers or by private truck operators. He estimated that 60 per cent of the highway traffic now moving is handled by contract carriers, and 20 per cent by private operators, and that the total volume of highway freight traffic in California, in terms of freight revenue, is approximately $45,000,000 a year.

Store-Door Service Provided

Mr. Worthington described the Southern Pacific's organization of the Pacific Motor Transport Company as a means of meeting the competitive conditions. The motor transport company is an express company under the California law, performing a complete freight service from store-door to store-door. The Pacific Motor Transport Company had a net operating revenue of $16,236 in 1929, and $60,325 in 1930. In the latter year the net revenue amounted to more than one-third of the gross. Mr. Worthington testified in favor of the regulation of contract carriers, and in reply to a question of Examiner Flynn, said that these should be required to secure certificates of public convenience and necessity in the same way that common carriers are required to do so.

The next witness was Edward H. Maggard, president and general manager of the Northwestern Pacific. He said that his company does not operate motor coaches or trucks, either directly or through a subsidiary, but that the railway has suffered a reduction of 40 per cent in its revenues and consequently has been compelled to curtail freight service and to reduce the number of

its employees. He said that motor competition has been met in part by reductions in rates.

W. L. White, general manager of the Yosemite Valley Railway, which has a 77-mile line between Merced, Cal., and El Portal, testified that his company had gross revenues in 1930 of $53,000, which was $200,000 less than the average for the years previous to 1927. He said that his company has been compelled to reduce its fares in an effort to meet motor vehicle competition.

J. R. Hayden, assistant traffic manager of the Atchison, Topeka & Santa Fe, Coast Lines, testified concerning the loss of freight revenue suffered by the Santa Fe in his territory. He said that the Santa Fe does not operate any motor trucks.

Regulation Necessary

H. M. Adams, president of the Western Pacific, testified that, in his opinion, the enactment of legislation placing the regulation of interstate motor coach and truck lines in the hands of the Interstate Commerce Commission is necessary. The law, he said, should require that certificates of public convenience and necessity be obtained from the commission, and that the motor carrier companies should be compelled to file tariffs, to adhere to their tariff rates and to refrain from fixing discriminatory rates. He said that the publication of joint interstate rail and motor coach or truck rates should be prohibited, but that railways should be permitted to operate motor coaches and trucks in place of trains where economies can be produced thereby. Mr. Adams said that it is proper for a railway to provide store-door collection and delivery service, but that this should be done only when it is made necessary by competitive conditions. He suggested that motor coaches should be used in place of passenger trains where the available traffic does not warrant regular railway service.

Further testimony as to losses in railway revenues due to highway competition was given by J. L. Scott, general passenger agent of the Western Pacific, H. A. Mitchell, president of the Sacramento Northern, J. F. Bon, assistant freight traffic manager of the Sacramento Northern, Frank E. Murphy, vice-president of the Virginia & Truckee, and J. C. Orlowsky, assistant traffic manager of the McCloud River Railway.

There was no testimony from motor coach or motor truck operating companies, and the hearing was adjourned to continue at Los Angeles, Cal., on February 2.

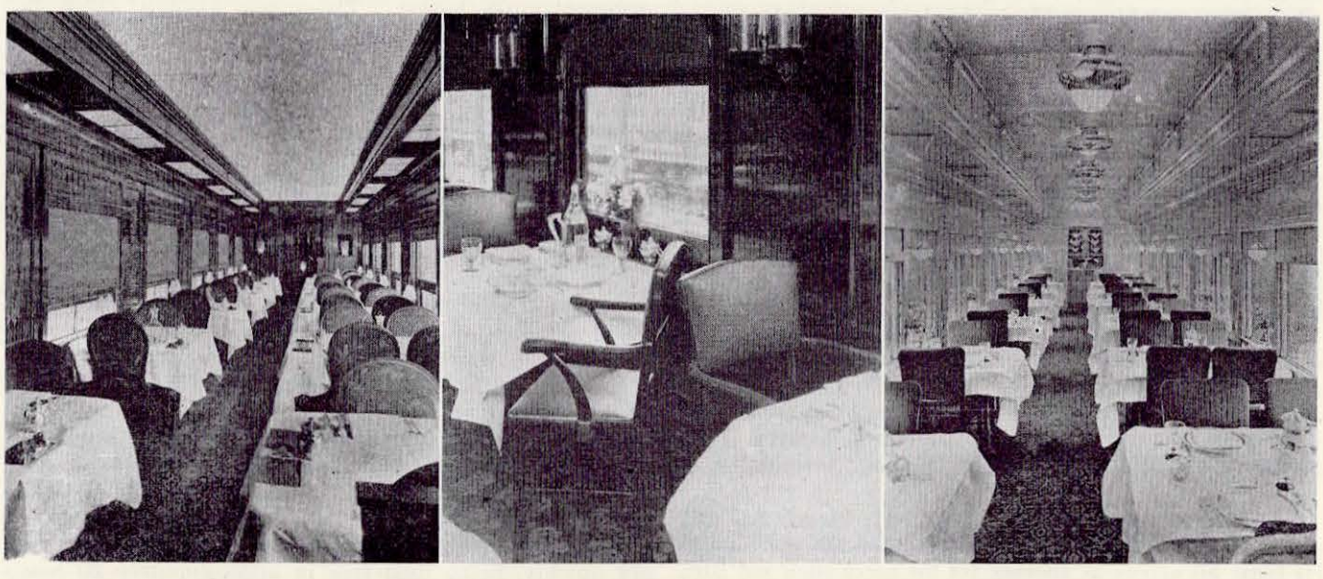
Aluminum Chairs For Dining Cars

ALUMINUM dining-car chairs, the product of the Aluminum Company of America, have recently been installed in a number of prominent passenger trains throughout the country, including the Broadway Limited of the Pennsylvania, the Twentieth Century Limited of the New York Central, the Blackhawk of the Chicago, Burlington & Quincy, and the Pioneer Limited of the Chicago, Milwaukee, St. Paul & Pacific. The aluminum chairs are constructed to withstand the constant vibration to which they are subjected while trains are in motion. The frames are fabricated into one integral piece and have shown from tests and actual installations a reduced maintenance cost over chairs of wooden construction. They weigh only half as much as wooden chairs of similar design and because of the welded one-piece construction they are not affected by changes in temperature.

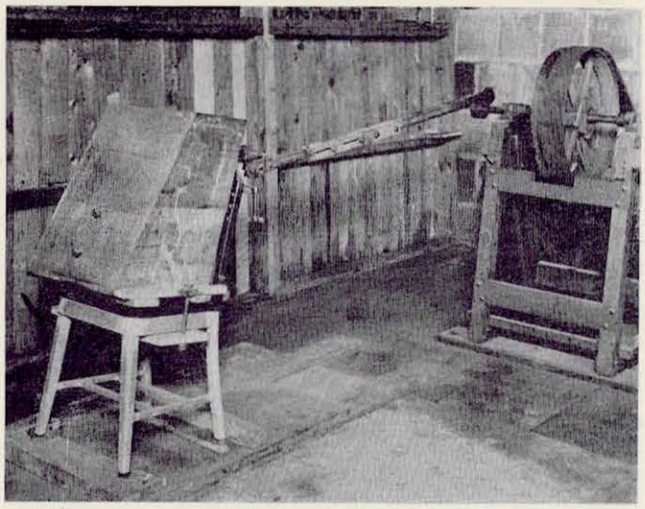
The seats for aluminum chairs are stamped out of sheet metal blanks on large presses, while the leg braces, seat frames, back braces and related parts are bent into shape on special forming equipment after they have been pressed from aluminum sheets. The legs are formed of either sheet or tubing; likewise, the back slats and stretchers. After the parts have been formed, they are jig assembled and the joints torch welded.

The sturdiness of the aluminum chair was established by means of a simple racking test. In this test the most severe strains a chair receives in service were duplicated. A weight of 180 lb. was placed on the seat of the chair and the chair bumped back and forth on its front and rear legs at the rate of 30 times a minute. The welded one-piece aluminum chairs, without arms, showed no structural weaknesses after being tested in this manner for more than 75 hours, while ordinary chairs of similar design loosened at the joints in but a few hours. Aluminum chairs with arms have been racked for more than 150 hours without showing any signs of failure. It is estimated that one hour on this test is the equivalent of one year of actual service.

Additional roads, besides the ones mentioned above, which have adopted aluminum chairs for dining car



Left to right—Aluminum Dining-Car Chair Installations on the Broadway Limited, Pennsylvania; the Pioneer Limited, C., M., St. P. & P., and the Blackhawk, C., B. & Q.



Aluminum Chairs Have Been Rack Tested with a 180-Lb. Weight for 75 Hours without Signs of Failure

use include the Atlantic Coast Line, the Baltimore & Ohio, the Chesapeake & Ohio, the Delaware, Lackawanna & Western, the St. Louis-San Francisco, the Missouri Pacific, the Missouri-Kansas-Texas, the Cleveland, Cincinnati, Chicago & St. Louis, the Reading, the Atchison, Topeka & Santa Fe, the Southern, the Southern Pacific and the Texas & Pacific.

Chairs Harmonize with Car Interiors

The dining cars of the Broadway Limited have an eggshell ceiling and carved walnut panels. With the exception of two large etched French glass fixtures at each end of the car and individual table lamps, the diners are indirectly lighted. In keeping with the trim and paneling, the aluminum chairs have a walnut finish and are upholstered in Canterbury Epingle fabric.

The interiors of the dining cars operating on the Twentieth Century Limited are finished in pale green with black and gold decorative lines. Henna and black are the predominating colors in both the window shades and in the carpeting. In keeping with the color scheme the light metal chairs are finished in a dull black enamel and are upholstered in henna mohair.

The interiors of the dining cars in use on the Blackhawk of the Chicago, Burlington & Quincy are done in silver-gray and blue. The welded one-piece aluminum chairs are finished in blue enamel and upholstered in blue mohair.

On the Pioneer Limited of the Chicago, Milwaukee, St. Paul & Pacific, mahogany panels and ceiling trim are employed in the dining cars. The ceilings are finished with ivory enamel. Two types of aluminum chairs are employed on these dining cars, arm chairs being used at the small tables while straight chairs are used at the large tables. All of the light weight aluminum chairs have a mahogany finish and are upholstered in blue leather.

Closely associated with the use of aluminum chairs in dining cars is the use of aluminum chairs in terminal restaurants and cafeterias. It is interesting to note that aluminum chairs are used in the restaurants of the Union Pacific Station, Omaha, Neb., the Grand Central Terminal, New York, and the new Cleveland terminal.

INTERSTATE COMMERCE COMMISSIONER P. J. FARRELL has just rounded out his thirtieth year of service with the commission. He began his service as attorney for the commission and later became chief examiner and solicitor of the law division; and in February, 1918, chief counsel. He was appointed a commissioner in June, 1928, by President Coolidge.

New Finishes and Enamels

E. I. DU PONT DE NEMOURS & Company, Inc., Wilmington, Del., has developed and put on the market a new line of interior and exterior finishes and enamels, employing an entirely new type of vehicle. This vehicle, which is called Dulux, has been developed in two forms; a gum, for use in the enamels, and an oil, for the new exterior and interior finishes, designed for use in the classes of work for which ordinary paints are now used. Both forms of the new vehicle, which are distinct chemical compounds, are made by chemical reactions requiring extremely close chemical control, and have no relation to the usual resins, gums and oils used in the manufacture of ordinary paints.

Dulux gum is a rubbery material which hardens to the toughness of horn, while Dulux oil is a truly synthetic oil derived from Dulux gum, in which no brittle material has been incorporated. This latter form of the vehicle is used in the Dulux interior and exterior finishes where a softer but more durable film is desired than that produced by the enamel. Owing entirely to the characteristics of the Dulux vehicles, many claims are made for the Dulux finishes and enamels, all of which, it is pointed out, are based upon exposure tests, wherein direct comparison was made between Dulux products and other paints, varnishes and enamels.

It is claimed for Dulux interior and exterior finishes, which are designed for application over either wood or metal surfaces, that they stand up longer and possess greater resistance to checking and cracking. Dulux finishes chalk like other paints, but it is said that this chalking proceeds at a much slower rate; a rate only sufficient to maintain a clean surface. It is also claimed that Dulux in tints and solid colors retains its gloss and color longer, owing to its slowness to chalk. It is claimed further that Dulux protects metal against the corrosive action of gases, fumes, salt-laden atmosphere and moisture to a greater degree, owing to the highly impervious character of the film which it produces and the resistance of this film to the growth of mold and fungus.

Other claims made for Dulux exterior and interior finishes are that they possess good hiding and spreading qualities; that they are highly resistant to spotting and smudging; and that they retain their original appearance much longer. These new finishes which are particularly adapted for application to freight cars, buildings, bridges and other wood and steel structures, may be applied by either spray or brush and are quick-drying, even under adverse weather conditions, thus protecting the finish from dust, bugs and rain.

Dulux enamels, which are based upon the Dulux gum vehicle, or upon mixtures of this vehicle with Dulux oil, are intended for places where the quality of durability must be combined with faster drying and harder surfaces, and where finishes of enamel-like appearance are needed or desired. These enamels are particularly adapted for use on railway passenger cars, furniture, machinery, etc.

In addition to possessing the favorable qualities of Dulux interior and exterior finishes, it is claimed that Dulux enamels, which may also be applied by either spray or brush, provide an exceptionally hard film which is highly resistant to marring, heat, alcohol, gasoline and oil, and which retains its flexibility over long periods, preventing chipping or cracking. These enamels dry quickly, being dust-free in approximately 20 min., and may be recoated within one hour after the first application. The enamel film is tack-free in four or five hours and thoroughly hardened in 10 to 12 hours.

A Mechanical Officer Appraises

Results Of Water Treatment

Improved feedwater declared important factor in long runs—Corrosion and embrittlement discussed in Western Railway Club paper *

By T. F. Powers

Assistant Superintendent of Motive Power & Machinery, Chicago & North Western, Chicago

THE primary purpose of a locomotive boiler is to generate steam. How efficiently this is done depends on many factors, the most important of which is the furnishing of feedwater that is free from large deposits of scale and mud. On the Chicago & North Western, for the past ten years we have gone into the study of feedwater extensively, and on some divisions most of the water supplied is treated in wayside treating plants. Our study of water showed that in some cases we were using water unfit for boiler use, while soft water was available only a short distance away. We had one division on which we were burning up fireboxes from scale in from one year to eighteen months, while we had three wells of soft water that we had been avoiding for years because we thought this water was unfit for boiler use. Under the directions of our water engineer, we began using this water and stopped using water from one well we supposed contained good water but which, analysis showed, contained 7 lb. of encrusting solids for each 1,000 gal. In this district, we are now able to run fireboxes indefinitely, while the flues run the four years allowed by law before renewal, thus improving a 148-mile division without one cent of expenditure.

Eleven Flue Failures in 4,343,302 Locomotive-Miles

It cannot be denied that the life of flues and fireboxes has been increased, due to the furnishing of better feedwater. Where soft water has been supplied, we now have locomotives coming into the shops for general machinery repairs not requiring firebox work. Formerly locomotives from these divisions would require renewal of side sheets or fireboxes. Unquestionably, we also have an improved performance from our locomotives on the road. In 1911, on the Chicago & North Western, we had 787 failures from leaky flues, or a failure from this cause for each 58,633 miles. In 1929, 18 years later, we had only 11 failures from leaky flues and operated 4,343,302 locomotive-miles to the leaky flue failure.

We still have occasional failures from leaky flues or a cracked side sheet, but they are rare and, when they happen, are thoroughly investigated. Unquestionably, the study given by our water engineers, in co-operation with the mechanical department, and the improved feedwater furnished as a result of these studies has been the largest single item responsible for the improved boiler conditions. In the past few years, many railroads have been extending engine runs over two or more divisions. Much of the success in the operation of long engine runs is unquestionably due to improved feedwater furnished to locomotives.

Wayside Treating Plants

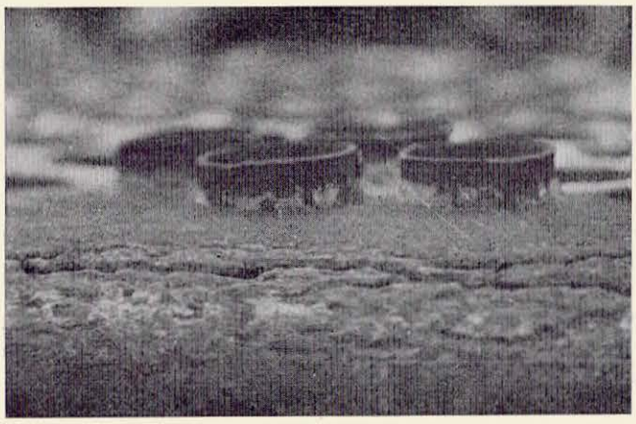
The best and most satisfactory way of treating water is with wayside treating plants. However, wayside treating plants are not satisfactory unless proper supervision is given them to insure that correctly treated water is delivered to the locomotive. It is absolutely necessary that the water be tested often enough to insure proper treatment. On the Chicago & North Western, all mechanical officers whose duties require their being on the road, such as master mechanics, road foremen of locomotives, fuel supervisors, boiler inspectors, and others, are familiar with the method of testing water. At each opportunity they make tests and forward the result of their tests to our water engineer.

The treatment necessary to remove scale has opened up new sources of trouble and new fields for study, moreover. There is no question but that we are now operating in some districts with a water that is considerably lighter than that used in former years. The larger locomotive, higher steam pressures, and the limited steam space of the modern locomotive make the problem of water getting into the cylinders a serious one. This condition is partly controlled by the use of blow-off cocks, and, where necessary, by the use of anti-foam compound. I expect to see the condition entirely corrected either by the proper design of a steam separator or a radical change in the design of the locomotive firebox and boiler to insure more steam space.

Corrosion and Pitting Still Constitute Problem

Another problem that still confronts us exists in destruction from corrosion and pitting, which is responsible for the expenditure of millions of dollars each year by American railroads. If pitting could be completely prevented, much of the heavy boiler work and expense incurred would be eliminated. It is not unusual to shop a locomotive for machinery repairs and, when flues are removed, to find that they are so badly pitted that they are only fit for scrap and that the bottom of the shell courses must be renewed because of pitting. In many cases, the crown sheets are pitted on the water side so badly that renewing is necessary. It is safe to say that the difference in cost to retip and apply a set of tubes and flues in the modern locomotive under the cost of scrapping and applying a new set is approximately

* The paper, of which the present article is an abstract, was entitled "Feedwater and Its Relation to Boiler Troubles," presented by Mr. Powers at the Western Railway Club meeting, held at the Hotel Sherman, Chicago, December 15, 1930.



Example of Failure by Embrittlement at Flue Sheet Flange

$1,000. From this it can be readily seen that pitting and corrosion run quickly into large expense.

While there may be other factors involved, unsuitable feedwater is undoubtedly the greatest contributing cause to this destruction which is today one of the largest single items of expense in connection with the maintenance of the modern locomotive. The study and research given this subject by chemists and water engineers in cooperation with mechanical officials will undoubtedly bring results; in fact, some very appreciable progress has already been made. We know that once pitting starts it is hard to stop; and as pitting is rust, we can expect the process to continue after they are applied if we allow flues or boiler plates to rust by lying exposed to atmospheric corrosion before going into our boilers. Keeping boiler plates and tubes coated with oil or other rust-proof compound will prevent atmospheric corrosion and will help retard corrosion after they are applied.

Some of the devices and materials being tested to prevent corrosion and pitting lead us to believe that as time goes on at least a large portion of the expenditure caused by pitting and corrosion will be overcome.

Many of the railroads are experimenting with "excess" treatment of the water. The objection to excessive treatment lies in the difficulty in maintaining this quality of water over an entire engine district and in the trouble liable to arise from light water.

Embrittlement Potential Source of Danger

There is still another boiler trouble which, while not as general as others, is coupled with a possible source of danger as well as expense. I refer to the embrittlement of boiler plates in the shells of locomotive boilers. Fortunately this is not a general condition.

The first case of shell embrittlement came to my attention about 1911, and since that time I have had opportunities of observing many such cases. On one railroad that seemed to have an unusual amount of this trouble, it was necessary to renew entire shell courses of boilers or to replace the entire boiler with a new one. The trouble was confined to locomotives operating in certain districts. Locomotives of the same age and class operating in other districts were not affected. This indicated that some local condition was responsible.

When these failures first occurred, the locomotive builders, steel manufacturers, and the railroad officers affected went into conference, as it was generally believed that the quality of steel and workmanship were the cause of this difficulty. It was a common practice at that time to punch holes for rivets in the plates. These holes were of a smaller diameter than that of the rivets to be applied, and the holes were then enlarged by reaming.

Working upon the assumption that improper workmanship and construction were at least partly to blame for the cracking of boiler plates, specifications were changed to require that in the construction of locomotive boilers all rivets holes be drilled; and inspectors were instructed to require that the utmost care be used in fabricating the shells of boilers. The most rigid inspection was insisted on in manufacturing of steel; but, regardless of all these safeguards, cracked boiler plates were still experienced in certain districts.

The theory was then advanced that strains set up in the steel at the time of manufacturing were responsible for cracking. It was hard to conceive, if this theory were to be accepted, why boilers in other districts should be free from this trouble. It is true that localized strains are set up in the rolling of boiler plate, flanging, riveting and especially in hydraulic riveting, and it must further be admitted that it is practically impossible to build a boiler free from localized strains. Some of the characteristics associated with the cracking of shell plates in locomotives are as follows:

It is confined to certain definite districts.

It is more prevalent in locomotives in passenger service.

The cracking is generally discovered below the water line.

In horizontal seams it is always confined to the outside row of rivets.

It appears always to start from the dry side of the plate.

Before failure occurs, the cracks are generally discovered by small hairline checks which readily open up under heat.

There is no elongation of the plates and, in many cases, rivet heads break off before failure occurs.

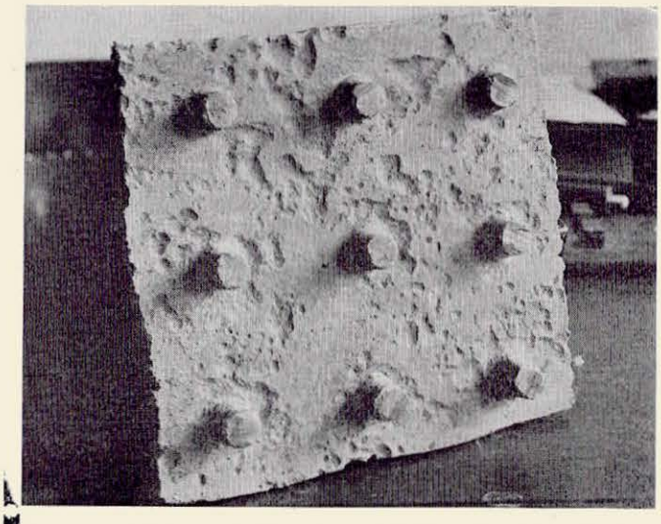
The cracks are very irregular but usually follow a general direction.

The cracks seem to be more numerous and appear to start where the plates are not well laid up.

In many of the cracked plates the chemical analysis shows that the steel manufacturers are complying with the specifications, although at the point of fracture decided crystallization is observed. The steel is very brittle and, in many cases, looks like cast iron.

Localized Strains a Factor

We were forced to give up the theory that the cause of this cracking was due to poor material or poor workmanship in manufacturing. While the failure of shell plates on locomotive boilers had not been a general con-



Excessive Pitting and Corrosion in Typical Side Sheet Section

dition on American railroads and had been confined to a few railroads, and then only in certain districts, there has been a considerable amount of this difficulty experienced in stationary plants and much study has been given the matter. Our attention was called to studies made at the University of Illinois. These studies indicate that localized strains combined with excessive use of sodium hydrate are the cause of embrittlement which results in cracking. As it is impossible to remove localized strains in the manufacturing of boilers, the cure appeared to lie in the correction of the feedwater. The boiler code committee of the American Society of Mechanical Engineers, working along the same line, has stated certain definite ratios of sodium sulphate to sodium hydrate to be carried in boilers for definite working pressure. Tannate has been suggested as an antidote. In accordance with these findings, treatment is now applied with a view of offsetting any difficulty with the feedwater; and since this treatment has been used, the trouble seems to have materially decreased. We feel that eventually complete elimination of cracking will be accomplished.

I have tried in this paper to express from the viewpoint of a mechanical officer some of the difficulties experienced from improper feedwater and to outline in a general way what has been accomplished by improving it. Definite progress has been made; but there is still much to be accomplished. If improvement is to continue, it is necessary that close co-operation exist between the water engineers and other officers in the mechanical and other departments. It is important that mechanical department officers keep the water engineers constantly advised of difficulties existing in locomotive operation due to water troubles. Thus, by the proper study of water conditions, they may be in a position to recommend to operating officers expenditures necessary and savings to be effected. In conclusion, our managements now realize that the furnishing of proper feedwater to locomotives effects a real economy and is definite assurance of good operating conditions.

Conclude Waugh-Armour Reciprocity Case

THE hearings conducted by the Federal Trade Commission under its complaint charging the Waugh Equipment Company and officers of Armour & Co. with unfair methods of competition for the alleged use of the traffic of Armour & Co. in selling draft gear to the railroads were concluded on January 27, when both the respondents and government completed the presentation of their evidence. The examiner will now prepare a report on the hearings, following which arguments of counsel will be heard before the commission reaches a decision, which will probably not be before June. It is reported that meantime the commission will hear arguments and render a decision on its first "reciprocity" complaint involving the Mechanical Manufacturing Company and officers of Swift & Co., the examiner's report and government's brief having been filed for some time.

Quality of Gear Made a Question

The respondents offered no testimony following that of F. W. Ellis, vice-president in charge of traffic of Armour & Co., as reported in last week's issue of *Railway Age,* it having been decided not to call A. J. Pizzini, president of the Waugh Equipment Company, and the defense was abruptly concluded by a motion to dismiss the complaint on several technical grounds, including the alleged failure of the government to prove its charges. Following this motion, which was denied, several exhibits were introduced bearing on the quality of the gear, purporting to establish superior merit as the reason for the purchase of the gear by the railroads. Principal among these exhibits were the reports of draft gear tests conducted by the American Railway Association at Purdue university and reports of comparative tests conducted by the New York Central lines. An abstract of the Purdue tests was published in the July 6, 1929, issue of the *Railway Age* on pages 32 to 37, inclusive. The report contained no expression of opinion as to the relative merits of the different designs tested and, at the time of introducing the exhibits, the attorney for the respondent made no deductions.

The report of the New York Central tests was a several-page summary of the results of tests conducted in the laboratory of W. H. Miner, Inc., and a technical discussion by H. W. Faus, engineer of tests of the New York Central, of the rating given different makes of gear, and this report was accompanied by a letter, written on March 21, 1928, to F. H. Hardin, assistant to the president, in which P. W. Kiefer, chief engineer of motive power and rolling stock, said in part:

> The Waugh gear, 400-A, National—M-17 and Miner—A-79-XB are the best three gear thus far tested and graded in accordance with our method of laboratory test....I am inclined to believe that the Waugh-Gould 400-A gear probably could be expected to provide slightly better protection than the Miner A-79-XB.

Following the introduction of this evidence, the attorney for the commission introduced several letters and reports from railway files for the alleged purpose of refuting implications which might be raised by the respondent that the merits of the Waugh gear were not open to question. These exhibits included a report received by S. B. Andrews, engineer of motive power, Chesapeake & Ohio, on January 31, 1929, in which two mechanical department officers, referring to the results of a test of the Waugh-Gould gear No. 402, said:

> From the foregoing results, we do not recommend any change in our present standard.

Another exhibit consisted of a letter written to J. P. Egan, superintendent of car inspection and maintenance of the New York, New Haven & Hartford, on December 11, 1928, in which an assistant, S. L. Sweet, said in part:

> In conference with W. H. Dunham, superintendent of the car department of the Chicago & North Western, I was informed that they were experiencing trouble with the Waugh-Gould 400 and 402 gear....due to the follower plates being 12 in. in length instead of 12½ in., as prescribed....It was further suggested that I look around the freight yard where I inspected a number of coal cars built in 1927 and 1928....
>
> A large number of the cars had gear carrier irons bowed downward.... In addition, the gear had moved upward.... In looking over a number of box cars, similar conditions were seen....The rail carrier was broken at the sill bolt hole and the car was not safe to run....The conditions observed are positive evidence that there is a lateral force being generated in the gear which will result in damage, depending upon the position of the gear in the pocket....
>
> Further information was obtained from C. J. Wymer, superintendent of the car department of the Chicago & Eastern Illinois....I was told that many cars equipped with Waugh-Gould gear were reported as having bent sills....It was further said that the president had instructed them to refrain from discussing the Waugh-Gould gear and its attendant troubles.

In another letter dated March 5, 1930, G. F. Hess, superintendent of motive power of the Wabash, writing to J. E. Taussig, president, said in part:

During the first three months of 1929, the Wabash placed in service 500 automobile cars equipped with Waugh-Gould 402 gear.

In November, we had an inspection made of about 25 gear and noticed nothing wrong....During February, 1930, we made another inspection....We found Wabash car No. 49289 with draft sills bulging on both ends of the car....The examination did not show anything seriously wrong with the draft gear proper, but the ends of the flat springs had worn into the followers, causing the followers to be forced against the draft sills.

On March 3, Wabash car No. 49503 was found with draft sills badly sprung. We found the follower plates badly cut by the end of the flat springs.

In another letter dated November 2, 1928, G. E. Coutant, assistant to the superintendent of motive power, of the Wabash, wrote a letter to G. H. Hess, superintendent of motive power, in which he said in part:

On October 31, accompanied with J. Matthes, chief car inspector, and H. L. Reynolds, I visited the Chicago & North Western to investigate Waugh-Gould gear on hopper cars built in April, 1928. We examined about 30 cars equipped with Waugh-Gould 400-A gear.

Design 400 was intended to overcome the defects in Gear 175, and the results with this Type 400 gear are covered by our report of May 16, 1928, as applied to 100 Chicago & Eastern Illinois cars built in June and July, 1927. The trouble in this case developed in less than one year after cars went into service and caused the Waugh-Gould people to bring out the 400-A gear, which is the one on the Chicago & North Western cars.

The trouble with these gear seems to be that, regardless of the tests in the laboratories, the gear do not properly center in service and, under heavy shocks, deliver a hammer below either in a transverse or vertical direction, depending on the manner in which the gear is applied.

In another letter introduced by the government, dated November 12, 1928, S. O. Taylor, master car builder of the Missouri Pacific, made a report to O. A. Garber, chief mechanical officer, in which he said in part:

Have inspected several hundred Chicago & North Western cars equipped with the old Waugh plate gear and Waugh-Gould Type 400, 400-A and 402 gear. . . . The larger number, equipped with old Waugh plate gear, had sills badly damaged and buckled and striking plates broken in a great many places. The 400 gear, I found, had been sticking, the couplers striking badly against the bearing. I noticed about 25 per cent of the 400-A gear had the couplers striking the striking casting....No irregularity in 402; however, the Type 400, 400-A and 402 have only been in service since the first of 1927.

In another letter, dated March 19, 1928, K. F. Nystrom, superintendent of the car department of the Chicago, Milwaukee, St. Paul & Pacific, reported to J. T. Gillick, vice-president, on a test made of gear at the laboratories of the Waugh Equipment Company, attended by representatives of the Atchison, Topeka & Santa Fe, the Baltimore & Ohio and the Erie, in which he said in part:

Four Type 402 gear and one Type 400-A gear were tested. Type 402 is the one offered the Milwaukee. Three of four gear of this type failed in the preliminary test which shows that sufficient experience has not been obtained in connection with the gear to make it practicable for application to new cars.

EMPLOYEES OF THE ST. LOUIS-SAN FRANCISCO have contributed $33,815 to the Frisco Relief Fund which was organized on November 19 for the benefit of former employees of the company who lost their positions as a result of the business recession.

AN AIR SERVICE INFORMATION BUREAU has been established by the Pennsylvania at its station in New York City. Information will be given not only concerning the Transcontinental and Western Air, and the Pan American Airways, but also concerning the Ludington Line, operating planes between New York and Washington; also the bureau will answer inquiries concerning the services of connecting air lines.

M. P. and L. & A. Joint Trackage Rights

(Continued from page 322)

favorable terms than can be done under the present method of operation, for its operating expenses will be decreased by the proportioned maintenance and taxes and the additional revenue derived from renting the property. In addition, he said, the railroad will have the right to sell a one-half interest in the property between Baton Rouge and New Orleans for the sum of approximately $5,000,000 and still retain full use of it.

L. A. David, assistant general manager of the Gulf Coast Lines, testified that the M. P. would save between $469,000 and $602,000 a year in the operation of its trains over the L. & A. tracks. He said that he believed the operating time for freight trains between New Orleans and St. Louis would be reduced by about 10 hr. due to the 50-mile shorter route and the elimination of car ferries.

Luther Walter, counsel for the New Orleans Public Belt, made his withdrawal from the case on January 30, stating that the New Orleans Public Belt was not opposed to the joint trackage agreement or to the bridge at Baton Rouge and asking that the commission include in its order a provision that the T. & P. traffic would continue to move to New Orleans over the west side rails as at present, that the interchange of the T. & P. be conducted through the facilities offered and to be offered at New Orleans and that the T. & P. be compelled to use the [projected] New Orleans Public Belt bridge in lieu of its present ferries when "reasonable rates have been made."

On January 30, testimony of witnesses for opposing interests was heard, those of the Illinois Central occupying a large portion of the time, since this road is the principal objector. L. A. Downs, president of the I. C., testified to show that the contract will be of little benefit to Baton Rouge and New Orleans and will do injury to the I. C., with no corresponding benefit to the M. P. He also said that the amount of money which the M. P. will be called upon to expend will be a wasteful expenditure which the public will ultimately have to bear; that the territory into which the M. P. seeks to extend its line is already served adequately by the Yazoo & Mississippi Valley and by the L. & A.; and that the only effect of granting the petition will be to take traffic away from the existing lines.

He stated that the existing facilities are adequate and if they are not can be made so by the expenditure of much less money than the M. P. will have to spend under the provisions of the contract.

In discussing the financial plans of the contract, he said the basis of the purchase of one-half interest of the L. & A. by the M. P. contemplated a valuation on the line between Baton Rouge and New Orleans of nearly the amount the present owners paid for the entire road. He also said that it was difficult to overcome the impression that the real purpose of the application is to secure access to the territory intermediate between Baton Rouge and New Orleans and to this extent the application involves an invasion of territory and a duplication of facilities not warranted by industrial needs.

Another portion of his testimony indicated that the plan will disrupt the consolidation program of the commission in that the L. & A. assigned to the Rock Island-Frisco group, will in effect be under the control of the M. P. so far as the line from New Orleans to Baton Rouge is concerned.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended January 24 amounted to 715,690 cars, a decrease of over 10,000 cars as compared with the week before and of 146,656 cars as compared with the corresponding week of last year, while the decrease as compared with 1929 was 210,784 cars. An increase of 852 cars as compared with the corresponding week of last year was shown in the loading of grain and grain products but all other commodity classifications and all districts showed reductions as compared with both years. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, January 24, 1931

Districts	1931	1930	1929
Eastern	162,784	201,434	216,418
Allegheny	142,578	177,227	188,708
Pocahontas	45,036	59,731	58,957
Southern	112,467	132,871	144,783
Northwestern	87,407	105,000	102,070
Central Western	107,902	124,756	139,550
Southwestern	57,516	61,327	75,988
Total Western Districts	252,825	291,083	317,608
Total All Roads	715,690	862,346	926,474
Commodities			
Grain and Grain Products	39,522	38,670	47,960
Live Stock	24,888	29,081	26,840
Coal	155,815	211,027	209,452
Coke	9,237	11,865	12,842
Forest Products	34,196	45,275	59,320
Ore	5,105	7,638	8,566
Mdse. L.C.L.	208,203	232,980	240,951
Miscellaneous	238,724	285,810	320,543
January 24	715,690	862,346	926,474
January 17	725,938	847,155	931,861
January 10	714,251	862,461	914,438
January 3	615,382	775,755	798,682
December 27	.....	538,419	639,389
Cumulative total, 4 weeks	2,771,261	3,347,717	3,571,355

The freight car surplus, which for some weeks has amounted to nearly as many cars as were loaded each week, averaged 673,039 cars for the week ended January 15. This was a reduction of 24,293 cars in a week. The total included 362,713 box cars, 238,967 coal cars, 28,959 stock cars, and 15,469 refrigerators cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended January 24 totalled 47,613 cars, an increase over the previous week of 498 cars but a decrease from the same week last year of 10,706 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
January 24, 1931	47,613	27,961
January 17, 1931	47,115	27,491
January 10, 1931	43,966	24,773
January 25, 1930	58,319	36,650
Cumulative Totals for Canada		
January 24, 1931	175,043	102,191
January 25, 1930	210,711	135,934
January 26, 1929	220,823	147,002
	— 35,668	— 33,743

A TUGBOAT guided by a pilot who rides, not on the tug, but on the bridge of the car float, which is being towed, has been put in service by the Canadian Pacific Car & Passenger Transfer Company, which transfers freight cars on floats between the New York Central at Ogdensburg, N. Y., and the Canadian Pacific at Prescott, Ont. Suitable wire connection being made, the operations of the machinery on the tug, steering, etc., are controlled by the man on the carfloat, this arrangement being necessary to put the pilot in a position high enough to see in all directions. This tugboat, built by the Canada Steamship Lines at Levis, Quebec, is propelled by Diesel-electric drive, and the remote control scheme and other electric features were provided by the General Electric Company.

Looking Backward . . .

Fifty Years Ago

The Postal Telegraph Company is the name of a corporation which is asking aid from the Congress of the United States. It proposes building an extensive system of telegraph lines and cables, and wishes to use the postoffices for local stations. It proposes to connect all the principal cities within 15 months, and to increase its plant to 70,000 miles within seven years.—*Railway Review,* February 5, 1881.

The government auditor of railroad accounts, whose duty it is to inquire into the condition and property of railroads that have received land grants from the United States, in his annual report recommends that provision be made for some plain and uniform system of reports from all companies doing interstate business, and for a special report in regard to accidents on railroads and railroad trains.—*Railway Review,* February 5, 1881.

The demand for steel rails continues to increase, and many mills are far behind in their orders. Prices have advanced to from $62 to $64, partly on account of the eager demand, and partly also in consequence of an advance of about $1 per ton in England and of about $1 per ton on ocean freights. Iron rails are in some demand in small lots at from $47 to $52. It is held by some that iron rails have had their day and that their production will virtually cease during the present year.—*Railway Age,* February 10, 1881.

Twenty-Five Years Ago

The Chicago, Milwaukee & St. Paul has awarded a contract to a Seattle contractor for the construction of the 275 miles of its Puget Sound extension between Tacoma, Wash., and Seattle and the Washington-Idaho state line.—*Railway Age,* February 9, 1906.

A. P. Titus has been appointed car accountant of the Wheeling & Lake Erie and the Wabash-Pittsburgh Terminal, with office at Pittsburgh, Pa. J. G. Walber, assistant to the general manager of the Baltimore & Ohio Southwestern [now part of the Baltimore & Ohio], has been appointed assistant general manager at Cincinnati, Ohio.—*Railway Age,* February 9, 1906.

The Pennsylvania is prepared to build a railroad from the harbor of New York through the eastern part of the greater city to and across Long Island Sound, and so connecting with the New England railroad systems, and in connection with the tunnels under the North and East rivers, bringing Long Island, for the first time, into direct railroad communication with the rest of the country.—*Railroad Gazette,* February 9, 1906.

Ten Years Ago

The immediate abrogation of all national agreements, the remanding of the question of rules and working conditions to negotiation between each carrier and its employees, and the re-establishment of the right to pay unskilled labor not less than the prevailing rate of wages in the various territories served by any carrier, were requested of the Railroad Labor Board on January 31 by W. W. Atterbury, vice-president of the Pennsylvania and chairman of the Labor Committee of the Association of Railway Executives. The request was accompanied by a vigorous statement of the present precarious financial condition of many of the carriers.—*Railway Age,* February 4, 1921.

The seven chiefs of labor unions countered General Atterbury's statement with an appeal to President Wilson for an inquiry by the Interstate Commerce Commission into the conditions which the railway executives are citing as the ground for demanding of the Railway Labor Board that the national agreements be abolished.—*Railway Review,* February 5, 1921.

Communications and Books . . .

Transportation—The Most Highly Perishable Commodity

AKRON, OHIO.

TO THE EDITOR:

When the train is not run, the car doesn't move, the seat is unoccupied or the berth is vacant, transportation to that extent is not performed and the loss can never be recovered. Compared with the so-called perishable commodities, the useful life of transportation is indeed short. Even ice without protection has a useful period of life. Such articles as meat, vegetables and dairy products, with ordinary care, permit some storage and allow time for marketing. But transportation when unused, never enjoys even a brief period of life. When we have failed to sell the transportation available our costs are increased accordingly for the units which are used.

The phrase "Readiness to Serve" may be a bogey-man and overworked, but it comprises a far larger portion of our costs than does the actual serving. True, merchants, bankers, or professional men also stand ready to serve and in so doing incur some costs, but their stock in trade is not dissipated if unused. Transportation is ephemeral. Money can be loaned tomorrow. The stock of sugar and wire nails need not be replenished until exhausted. Even the human machine is wound up for about so much constructive effort. Transportation not created by the machine called the railroads is gone forever, but the machine has to be wound up again and again and the cost is much the same whether used at nearly a maximum capacity or only partially.

Have we as railway officers sufficiently impressed the man in the street with the value to him of being able to ship and ride today or tomorrow or not at all, at his convenience and sole choice, and without notice to us or cost to him? Have we brought home the fact that railroads serve all territories in all seasons, handling perishable, bulky, heavy disagreeable and dangerous commodities, while the subsidized competition now causing us so much trouble chooses favorable territories, operates seasonally and handles only the cream of the business?

J. M. HOOD,
Vice-President—Operation,
Akron, Canton & Youngstown.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Alaska Railroad. Report of Special Select Committee on Investigation of the Alaska Railroad. Senators Howell, Kendrick, and Thomas of Idaho composed this committee. Includes "Report of Examination of the Accounts of The Alaska Railroad" p. 11-36. Senate Report no. 1230, 71st Cong., 3d sess. 36 p. Pub. by U. S. Govt. Print. Off., Washington, D. C.,

The Co-ordination and Development of Transport. Final Report of the Royal Commission on Transport. Cmd. 3751. Includes historical survey of transport, and general discussion of the problems and possibilities of railways, highways, road transport, tramways, canals and inland waterways, harbours, docks and coastwise shipping, with recommendations. 240 p. Pub. by H. M. Stationery Office, London, England. 4 shillings. Available in this country from British Library of Information, New York City.

Industrial and Commercial Germany. Includes "a survey of Germany's economic position and the most important problems arising out of it, together with a series of articles . . . . . dealing with the principal branches of industry, their capacity and their output." 194 p. Pub. by Hamburg-American Line, New York. *Apply.*

The States Through Irish Eyes, by E. Œ. Somerville. Miss Somerville was the first lady M.F.H. in Ireland and she likes our railroad stations and trains, but not the way our trains are started and stopped, Chapter IV. "No *wagon-lit* accommodation in European trains could compare with the comfort of the drawing-room apportioned to us." p. 25. In Chapter V she pays her respects to another American means of transportation, the Aiken buggy. 200 p. Pub. by Houghton, Mifflin Co., Boston and New York, $2.50.

Periodical Articles

Automatic Block Signalling on the Canadian Pacific Railway, by A. J. Kidd. "Of the 1,210 road miles of automatic block signals in service. . . .212 road miles have double track signalling, while the balance, or 998 miles, is made up of 243 miles of single track 'overlap control' and 755 miles of 'Absolute permissive block signalling.'" Illustrated. Engineering Journal (Canada), January, 1931, p. 19-23.

Caution! Danger Ahead! by Edward Hungerford. "It has been suggested that the present emergency is large enough to call a railroad convention—presidents, vice-presidents and other high executives—to continue in session for a week, if necessary, and to thrash out some of the problems which are so vexing to the business as a whole." Saturday Evening Post, January 31, 1931, p. 21, 47-52.

How Shall Directors be Chosen? by Malcolm C. Rorty. "Votes of employee and public" p. 25. Nation's Business, February 1931, p. 23-25.

I Smell Smoke! by Thomas F. Dougherty. The Assistant Chief of the New York Fire Department discusses fire hazards, fire losses, and preventive measures that can be adopted by grown-ups and children in homes and in offices. The figures for deaths in fires and property losses are startling. Saturday Evening Post, January 31, 1931, p. 29, 99, 102, 105.

Nanking-Pukow Train Ferry. This will be the first railway train ferry to be operated in China. Illustrated. Far Eastern Review, December 1930, p. 669-673.

A New Rival for the Railroads, by Curtis Hodges. Pipe lines, their history and possibilities. Illustrated. Nation's Business, February 1931, p. 33-35, 122-124.

La Nouvelle Signalisation des Chemins de Fer Français, by M. Tuja. Illustrated with charts showing in parallel columns signals as now used, and signals to be installed—both day and night aspects, in colors. Colors include green, red, yellow, mauve and light blue. Revue Générale des Chemins de Fer, January 1931, p. 3-28.

Six Men Who Shape Railroad Destiny—The Group of Executives Which Charted the Four Big New Systems, by S. J. Woolf. "And although the outcome of the deliberations of Einstein, Millikan and Michelson in California will eventually play an important part in the lives of men, we of the present generation will be more materially affected by the decisions of the six who have been meeting in New York." The six are W. W. Atterbury, J. J. Bernet, P. E. Crowley, O. P. and M. J. Van Sweringen, and Daniel Willard. New York Times Magazine, January 25, 1931, p.8-9.

Train-Ferry Landings at Port Mulgrave and Point Tupper, N. S., by D. B. Armstrong and W. Chase Thomson. An illustrated description of the problem met, construction details, and erection equipment. Engineering Journal, January 1931, p. 3-14.

You Pay Your Money—But What's Back of Your Choice? by Fred C. Kelly. An inquiry into why some people prefer some railroads and others, and what the railroads are doing to attract passenger traffic. American Legion Monthly, February 1931, p.12-13.

A Young Man Goes to Work, by Pare Lorentz, Presentation of experience of a college man recruited for industry, with conclusion "The man who starts at the bottom of a corporation to work his way up is a fool." p.207. "Straws in the Wind Section" of Scribner's Magazine, February 1931, p.205-208.

Odds and Ends . . .

A Faithful Pen Holder

J. E. McGurk, train dispatcher on the St. Louis division of the Pennsylvania, claims some sort of a record for a pen holder which he uses daily. He began using this pen holder 25 years ago, and has used no other since.

Two Thousand Sweaters

Joseph E. Doremus, agent for the New York Central at Marble Hill, N. Y., claims the sweater-knitting championship, and as far as we are concerned, he may have it. Joe has been knitting for 13 years, and recently completed his 2,000th sweater.

The I. C. C. and the Zoo

Live ostriches, camels, zebras, and even blood-sweating behemoths, need no longer fear that they will be over-charged when riding on the railways. The Interstate Commerce Commission in its Released Rates Order No. 916 has now provided the exact rates under which they are to be transported.

Lincoln and the B. & O.

Observing onlookers have noted that in the film "Abraham Lincoln" the baggage check on the martyred president's bag reads "B. & O." This is historically correct, since the Civil War president completed the last portion of his journey from Springfield to Washington for his first inauguration over that railroad.

Lifetime Passes

After securing special permission from the Interstate Commerce Commission, the Illinois Central has presented lifetime passes to 800 veteran employees. These passes are personally signed by President L. A. Downs, and are contained in neat leather cases. All employees with a continuous service record of 40 years or over will have these passes good for themselves and their wives.

Car Bandits Beware!

R. G. Pickrell, captain of the Canadian National Police Revolver Team, has won the International Pistol Championship. Pickrell shot a score of 531 out of a possible 600, equalling the world's record, to win the championship. Pickrell and his associates on the team have captured 13 first prizes, one fourth, and one sixth prize in major shooting events in Canada and the United States within a year. Pickrell is also the United States rapid fire champion.

Railroader a Member of the "Lost Battalion"

Lowell R. Hollingshead, delivery clerk for the Norfolk & Western at Portsmouth, Ohio, is one of four survivors of the squad that was sent to bring help to the "Lost Battalion" during the World War. In the course of his journey, Hollingshead was captured by the Germans, after being wounded, and was also sent back by the German officer in command to the major in charge of the American forces with a demand that they surrender, which, needless to say, was not considered.

Much-Used Track

FORT WORTH, TEX.

TO THE EDITOR:

In the *Railway Age* of January 17, it is stated that the D. & H. track north of Avoca, Pa., probably has more railroads operating over it than any other track in the country excluding terminals. I notice the greatest distance used by the four roads is 22 miles. On 35 miles of the Rock Island track between North Fort Worth, Tex., and Dallas, four roads operate over the entire distance: the Rock Island, the Frisco, the Southern Pacific, and the Fort Worth & Denver City, having a total of 27 scheduled trains daily.

A. J. MESSERSMITH,
Auditor, Chicago, Rock Island & Gulf Ry.

Railway Presidents Named Knights of Malta

Among a group of Americans recently elected to the Knights of Malta, the highest papal honor, were Lawrence A. Downs, president of the Illinois Central, and John J. Pelley, president of the New York, New Haven & Hartford.

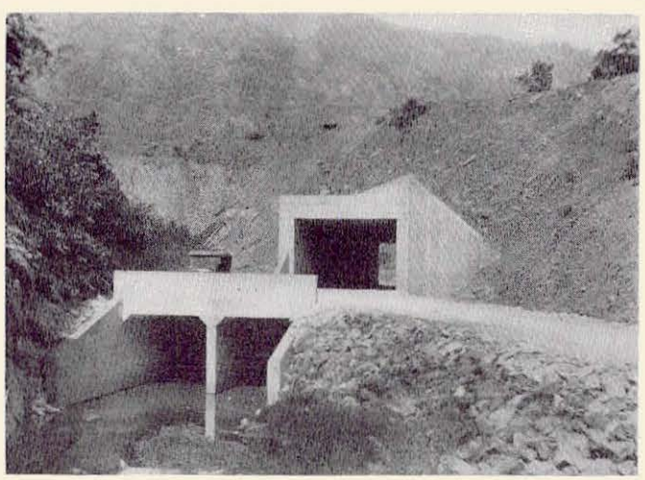
Camel Loses to Locomotive

When a locomotive hits a camel on the Dakota prairie, that's news! And if the locomotive happens to be the largest steam rail engine in the world, that's just too bad for the camel. A few days ago, "Old Charlie," a camel which was housed at Bagdad Park, Dickinson, N. D., found an opening in the enclosure and wandered out on the Northern Pacific tracks where he disputed the right-of-way with one of the 5,000 type, 1,118,000-lb. locomotives which was drawing a freight train. "Old Charlie" died of a broken neck.

Twice To The Moon and Back
German Railroads' Daily Mileage

That the daily mileage of passenger and freight trains of one single railroad system is equal to two round trips between the earth and the moon, is indicated by the data contained in the German Railroads calendar for 1931. The number of passengers transported annually over this railway system is more than twice that of all Class I American railroads combined. The total mileage is 33,000 miles with a total of 75,000 miles of track. There are no fewer than 130 frontier and transfer stations which connect the German Railroads with surrounding foreign countries. Among the many hundreds of railway bridges in Germany, 24 cross the Rhine. The German Railroads operated 453 extra trains to handle the traffic to the Leipzig Spring Fair. The total number of cars which it placed at the disposal of German industry was 46,360,911. The company owns 69 steamships of which 61 are in the public service. The total annual income of the German Federal Railroad Company amounts to approximately 5 billion marks (roundly 1,125 million dollars). Of this, the gross income of 205 days in the year is required to pay salaries and wages for the company's 700,000 employees, while expenses for material eat up 99 days' returns. Reparations payments account for 77 per cent of the remaining 61 days' revenue.

* * *



A Rail, Highway and Stream Crossing on the New Line of the Louisville & Nashville Near Hagans, Va.

NEWS

Proposed Allocation of New England Roads

Inclusion of B. & M. and two Maine lines with C. & O. is suggested

A plan for the allocation of the New England railroads among six trunk lines was outlined by W. H. Boyd, Counsel for O. P. and M. J. Van Sweringen, in an address at the annual dinner of the Providence (R. I.) Chamber of Commerce on February 3. The plan was submitted as a counter-proposal, to be considered by the New England Railroad Committee, for proposals which have been made for a single all New England system, for a combination of the New Haven and Boston & Maine, or to maintain the existing status, all of which Mr. Boyd criticized.

The six trunk lines, to which the New England roads would be assigned under Mr. Boyd's proposal, are the New York Central, the Pennsylvania, the Baltimore & Ohio, the Chesapeake & Ohio-Nickel Plate, the Canadian National and the Canadian Pacific. Under the plan the Chesapeake & Ohio-Nickel Plate would receive the Boston & Maine, the Maine Central and the Bangor & Aroostook. The New York Central would retain the Boston & Albany and the Rutland, except the Rouses Point-Ogdensburg line of the latter; the New York, New Haven & Hartford would be controlled jointly by the Pennsylvania and the Baltimore & Ohio. No new allocations would be made to the Canadian roads, but they would retain their present lines in New England.

The so-called bridge lines, the Delaware & Hudson, the Lehigh & Hudson River, the Lehigh & New England, the New York, Ontario & Western and the Rouses Point-Ogdensburg line of the Rutland, Mr. Boyd said, would be "allocated between or among the proposed four Eastern trunk line systems in such manner as to give them access to the Hudson River gateways and direct connection with the New England railroads allocated to them respectively."

Other suggestions contained in the plan were:

"That all existing joint through routes, including differential rail routes, and all gateways should be kept open unless changed by order of the Interstate Commerce Commission.

"Existing routes from New England interior points to New England ports, and existing water and rail differential routes applying through New England ports, should be maintained unless changed by order of the Interstate Commerce Commission.

"The Eastern trunk line systems and the two Canadian systems should be called upon to co-operate and should co-operate with the New England railroad committee and with each other in working out such exchanges of rights as may be practicable and necessary in the public interest to give competitive service without unduly weakening or giving undue advantage to any system.

"The joint use of terminals should be left open for later consideration."

"Transportation by artificial waterway—that is by waterway on which large sums had to be spent originally for its development, and large sums have to be spent annually for maintenance—is not now and does not appear likely ever to be an economical form of transportation in the United States. The common belief that it is economical is—in the light of the visible facts—simply a superstition."

—Thomas F. Woodlock in the Wall Street Journal

Canadian Commission Head Resigns

Hon. H. A. McKeown, chairman of the Dominion Board of Railway Commissioners, has resigned. An order-in-council accepting the resignation of Judge McKeown, who was formerly Chief Justice of New Brunswick, was approved by the Canadian Cabinet last week. Announcement to this effect was made by Hon. R. J. Manion, Minister of Railways and Canals.

Dr. Manion stated that Judge McKeown had resigned at his own request. The former chairman had previously intimated to the minister that his duties were too onerous and exacting for him to continue and had intimated to Dr. Manion that he would be pleased to be relieved of his work.

Judge McKeown was appointed on September 16, 1924 as chairman of the Board of Railway Commissioners.

Another vacancy exists on the board due to the resignation of Thos. Vien as commissioner recently.

The resignation of Judge McKeown becomes effective on March 1 next.

Rail Mergers Opposed in Report to Senate

Congressional committees to give "low-down" on consolidations and holding companies

Members of the Senate committee on interstate commerce are scheduled to meet on February 10 to learn all about the exhaustive investigation they have been making since Congress adjourned last June, on the consolidation and unification of railroad properties and the effect of them upon the public interest, which will be laid before them in the form of a report of a special research expert, William C. Green, who had previously served the committee as an expert in connection with proposed legislation on communications and power. Senator Couzens, chairman of the committee, obtained passage of a resolution providing for such an investigation, at an expense not to exceed $5,000, with a provision that the report should include such recommendations for legislation as the committee deems advisable.

The House committee on interstate commerce has also announced its intention of making public shortly a report on its investigation as to who own the railroads, with special reference to the activities of holding companies, investment trusts, etc., which was also supposed to include recommendations as to what should be done about it legislatively, as the Interstate Commerce Commission recommended that Congress look into the matter with a view to placing holding companies under regulation. The matter was referred to a sub-committee headed by Chairman Parker of the committee, and W. M. W. Splawn was retained as special counsel. Under the direction of Dr. Splawn, and with some assistance from the Interstate Commerce Commission, a large amount of information on the subject has been collected, largely through questionnaires which, if they have been fully answered, would make available far more information than the Interstate Commerce Commission or the public has ever had as to the principal stockholders of American railroads and the inter-relations between railroads and investment or holding companies. For a long time it was taken for granted that recommendations would be made for legislation at this session of Congress but as the time for adjournment has approached less has been heard regarding the possibility of recommendations.

Among the conclusions in the report to be considered by the committee is the following, which Senator Couzens would probably have been willing to write for less than $5,000:

"That a study of the records, hearings, and experience of the past ten years does not disclose a situation requiring in the public interest further encouragement of a comprehensive program of consolidation as contemplated by the transportation act but that regulatory legislation should be continued or enacted giving the Interstate Commerce Commission full control of permissible unifications."

The report states that the consolidation legislation has not and cannot accomplish its original purpose for various reasons, including the following:

Equalization between carriers, so that the average rates will produce substantially the same rate of return for each, by consolidation, can only be accomplished by grouping all carriers in any given competitive territory in systems.

Such a grouping can only be made by formulating a plan, which must be then followed.

Opinion is practically unanimous that the provision for such a plan is impracticable.

A complete grouping will not be carried out under a voluntary system because the strong roads refuse to take over weak roads unless the transactions are commercially justifiable.

A compulsory system cannot be put into effect because one carrier cannot be compelled to acquire another.

In view of the position of the stronger roads as to the acquisition of unprofitable weak roads, and in the light of the history of the past ten years, there exists no reasonable ground for belief that the weak road problem will be solved by a policy of consolidation.

That there is no definite evidence that consolidations will result in substantial economies.

That there is no substantial evidence that consolidations will produce any reductions in rates.

That a program of consolidation providing for the grouping of carriers into provisional systems under a complete plan with provisions for adjustment of income within each system on a recapture basis might assist the weak roads generally. That such a plan is objected to as amounting to compulsion, and is further subject to the same objections as the present recapture law and the present provision for a complete plan, and might be of doubtful constitutionality.

That the greatest benefits of consolidadations now contemplated will accrue to lines already strong, who are seeking largely to acquire other strong lines and thus build up their systems, rather than to take in weak lines.

That labor will probably suffer from such consolidations as are now sought, unless some protection is afforded employees.

If consolidation legislation is to be continued, the report says, provision should be made for the protection of employees and for the regulation of holding companies, and additional legislation and amendments as to procedure, of the character set out in S.668 (the Fess bill), should be adopted.

New Oklahoma Commissioner

Paul A. Walker has been appointed as a member of the Oklahoma Corporation Commission at Oklahoma City, Okla., succeeding Fred Capshaw. Mr. Walker has also become chairman of the commission.

Correction

The Virginian was incorrectly reported in the tabulation on page 236 of the January 24 issue of *Railway Age* as having purchased 1,000 gear from the Waugh Equipment Company in 1928. The total number of Waugh gear in service on this line is 36 units, 34 of which are installed on electric locomotives and two on a 120-ton gondola car.

Bill for Interest Refunds Favorably Reported

The Senate committee on interstate commerce on February 3 favorably reported to the Senate the bill S.3199, authorizing refunds to certain railroads of interest amounting to $48,852 erroneously collected by the government on account of overpayments under sections 209 and 212 of the transportation act.

Express Agency Appeal Rejected

The Supreme Court of the United States on February 2 upheld a decision of the supreme court of appeals of Virginia affirming an order of the Corporation Commission of Virginia that had denied the Railway Express Agency, Inc., a certificate of authority to do an intrastate business in that state without taking out a charter in Virginia.

Motor Coach Lines Cut Fares

At a meeting in Kansas City this week, 12 motor coach lines operating in the Southwest lowered their passenger fares to two cents a mile effective February 5; this in order to meet the two-cent rate on the St. Louis-San Francisco and other railroads in the Southwest. In addition the motor coach lines agreed to allow passengers a 10 per cent reduction on round trip tickets.

P. R. R. Supplants Rail Service With Bus in N. J.

The Board of Public Utility Commissioners of New Jersey in a recent order approved municipal consents which had been obtained by the Pennsylvania General Transit Company, highway subsidiary of the Pennsylvania, for the operation of buses between Flemington and Lambertville, N. J. This highway service is being provided in lieu of rail motor car service, formerly operated by the Pennsylvania on its Flemington branch.

Discontinuance of rail service over the branch was permitted in a previous order of the commission. Testimony in this latter case showed that the total passenger train revenue received by the Pennsylvania in the operation of its rail motor car on the line amounted in 1929 to $6,506.11, whereas the cost of the rail service was $13,471.91. The route is approximately 12 miles in length.

Grain to Move Via Hudson Bay This Year

A test movement of two or possibly three cargoes of grain, about 750,000 bushels, will be shipped through the port of Fort Churchill on Hudson Bay the middle of next September, according to present plans. A conference held here with representatives of shipping interests indicated that there will be no difficulty getting private steamship companies to undertake the movement.

Motor Vehicle Bill Before Missouri Legislature

The Missouri legislature has before it a bill which would give the state Public Service Commission jurisdiction over all common carrier motor coaches and trucks, whether or not operated on fixed routes. The bill provides that truck lines must secure certificates of convenience and necessity, and fixes a schedule of license fees ranging from $10 to $910, depending on the size of the truck.

Accounting Officers to Meet in Chicago

"Having in mind the existing business conditions," reads an announcement issued by G. T. Bunting, vice-president of the Illinois Central and president of the Railway Accounting Officers Association, "and conforming to the results of the canvass recently made of all members of the association, and with the consent and co-operation of our Mexican members, the executive committee has fixed Chicago as the place, and June as the time, for the 1931 convention of the Railway Accounting Officers Association."

Bill to Separate Pipe-Lines from Oil Business

A bill to subject oil pipe-line companies to the commodities clause of the interstate commerce act, intended to prevent them from engaging in any business other than that of a common-carrier and to divorce them from the producing, refining and marketing phases of the oil business was introduced in the House on January 29 by Representative Hoch of Kansas. The bill simply substitutes the words "common carriers subject to the interstate commerce act" where the present law uses the words "railroad company."

Motor Vehicle Bills Before Alabama Legislature

Several bills designed to strengthen the regulation of highway carriers operating in Alabama have been recently introduced in the legislature of that State. One of the measures provides that the Alabama Public Service Commission in prescribing rates for these carriers shall give consideration to the "character and value of the service to the public and the effect of such rates upon other transportation companies, if

any, and so far as possible avoid unreasonable competition with existing transportation agencies." The taxation factor of another of these bills calls for an assessment of one cent per mile for each trip on motor trucks of less than three tons capacity, three cents per mile on those of more than three tons and less than five tons capacity, and five cents per mile on all trucks of five tons or over. This bill would make the tax on buses one cent a mile for a ten-passenger vehicle, two cents per mile for those carrying between 10 and 20 passengers and three cents per mile for all busses of more than 20-passenger capacity.

Arizona Train Limit Law Hearing Resumed

The hearing in the United States District Court of the suit of the Atchison, Topeka & Santa Fe and the Southern Pacific to enjoin the enforcement of the Arizona law which limits the length of freight and passenger trains operated in that state was resumed at Phoenix, Ariz., on February 2 with the presentation of additional testimony by witnesses for the Southern Pacific. The main case for the state with K. Berry Peterson, attorney general of Arizona, as the defendant, was closed at Phoenix on December 19.

National Office Management Association Award

The National Office Management Association, at its annual meeting in June, will make the first of its Leffingwell Medal awards. This award, donated by W. H. Leffingwell, president of the Association, is designed to recognize "outstanding accomplishment in office management." The competition is open to all, membership in the Association not being a condition of participation. Information on the awards may be obtained from H. C. Pennicke, secretary, National Office Management Association, 8 East Market Street, Indianapolis, Ind.

Honor Medals Awarded

Upon recommendation of its committee on award of medals of honor, approved by the Interstate Commerce Commission, the President has awarded medals of honor to Alfred G. Gish, of Shawnee, Okla., an engineman employed by the Chicago, Rock Island & Pacific, and to John A. Lugar, of Pana, Ill., a signal man employed by the Cleveland, Cincinnati, Chicago & St. Louis, for acts of heroism in averting serious casualties. The applications were submitted by Hal S. Ray, director of personnel of the Rock Island, and by President Crowley, of the New York Central.

Seattle Safety Meeting

A regional meeting of the Safety Section of the American Railway Association was held in Seattle, Wash., on January 22 with an attendance of 397 railroad men. The program of the meeting, of which C. L. LaFountaine, general safety supervisor of the Great Northern was chairman, included an address by C. T. Bailey, first vice-chairman of the section; discussions on transportation accidents; accidents in mechanical departments; accidents in maintenance of way departments; and ways and means for reducing highway crossing accidents. During a luncheon, F. M. Metcalfe, superintendent of safety of the Northern Pacific, was toastmaster and H. A. Rowe, chairman of the section, was the principal speaker.

Two-Cent Passenger Fares in Effect

Two-cents-a-mile passenger fares for coach service went into effect on February 1 in a considerable section of the Southwest and also in parts of Kentucky, Tennessee, Mississippi and Alabama, the Interstate Commerce Commission having declined to suspend tariffs filed by the St. Louis-San Francisco establishing this reduced rate throughout its system. This in spite of the protest filed by the Missouri Pacific, the St. Louis Southwestern and the Missouri Kansas-Texas. The Mobile & Ohio had also filed a similar tariff and the Illinois Central established similar rates between competitive points. Seven southwestern lines also applied for authority to establish similar fares on short notice between competitive points, which was granted by the Commission.

Club Meetings

Alexander Legge, chairman of the Federal Farm Board, was the speaker at a luncheon given by the Traffic Club of Chicago on January 28.

The St. Louis Railway Club will hold its next meeting at Hotel Statler, St. Louis, Mo., on Friday evening, February 13. J. W. Cummins, chief inspector of the Illinois State Department of Agriculture, will discuss the activities of his department as affecting the railroads.

The Railway Car Men's Club of Peoria & Pekin (Illinois) will hold its next meeting at the Union Station, Peoria, on Friday evening, February 20. The discussion will be on the changes in the interchange rules.

The Traffic Club of Pittsburgh (Pa.) will hold its annual dinner at the William Penn Hotel on Thursday, March 5.

New Jersey Highway Route Denied P.R.R.

The Pennsylvania General Transit Company, highway subsidiary of the Pennsylvania, was one of three petitioners whose applications for permission to install bus service between Jersey City and Atlantic City, N. J., were recently denied by the Board of Public Utility Commissioners of New Jersey. The other applicants were the Public Service Interstate Transportation Company and the Nevin Bus Line.

The entire route proposed by the Pennsylvania General Transit Company would have extended from New York City through Jersey City and thence to Atlantic City. In denying the applications the Board found that much of the demand for through service along the proposed route was supplied by buses operating solely in interstate traffic from New York to Atlantic City and intermediate points. In addition, the decision pointed out, two railroads provide direct service between the terminals of the route and by connection with their various branches provide a local service between municipalities intermediate to the terminals.

California Fruit Rate Case Assigned for Argument

The Interstate Commerce Commission has assigned two days, March 4 and 5 for oral argument on the California deciduous fruit case, in which the California Growers' & Shippers' Protective League has instituted a new proceeding for a reduction in the rates from California to eastern points, after the Supreme Court had held invalid the commission decision reducing the rates under the Hoch-Smith resolution. The league filed a new complaint on which hearings have been held asking for lower rates under section 1 of the interstate commerce act than the commission had allowed under the resolution. Part of the time is to be allotted, however, to a similar case involving rates on apples from the Pacific northwest on complaint filed by the Department of Public Works of Washington.

Manufacturers' Railway Offers Car-Ferry Settlement

The Manufacturers' Railway has submitted a new proposal to St. Louis (Mo.) city officials for a compromise of obligations of the company under the terms of a franchise granted it in 1905. The railway has asked the City Board of Estimate and Apportionment to dismiss the suit for $90,000 filed several years ago. In return the company offers to pay the city $51,000 at once and $3,000 a year for ten years and $5,000 a year thereafter. The franchise stipulated that the railroad should build a seven-mile East Side belt line and operate car ferries across the Mississippi river; and also pay the city $5,000 a year from 1908 to 1918, and $10,000 a year thereafter. The ordinance also provided that the company should forfeit $25,000 if it did not construct the inclines for the car ferries or the East Side belt line.

Court Enjoins I. C. C. Order to Construct Oregon Line

The United States circuit court of appeals at Portland, Oregon, on January 29 enjoined the Interstate Commerce Commission from enforcing its order requiring the Oregon-Washington Railroad & Navigation Company to construct a railroad from Crane, Oregon, to Crescent, 185 miles. The opinion, in which each of the three judges in the case concurred, was based upon the question of the authority of the Interstate Commerce Commission to order the construction of branch lines, and the sufficiency of the testimony to justify the order if authority for it be found. The court construed the Transportation Act of 1920 to mean that the authority of the commission may be limited to such extensions of line as are reasonably necessary to reach communities and industries which the carrier has professed to serve or to an undertaking which the

railroad has expressly or impliedly assumed. When the act is interpreted in that manner the commission's order exceeds the authority of the commission and is void, the court stated. It is expected that the commission will appeal.

C. P. R.'s Revenues Increase

The net revenues of the Canadian Pacific for the month of December were $4,161,519, an increase of $1,008,251 over the corresponding period of 1929. Due to this substantial increase the net for the 12 months, $38,348,558, or a decrease of $4,895,885 from 1929, is much better than might have been originally expected, following the long series of declines in revenues month by month over the past year.

Gross for the month was $16,324,469, an increase of $807,237 over 1929, this being the most encouraging feature of the statement. Expenses were further cut by $202,014, totaling $12,162,949, and making net for the month $4,161,519, against $3,153,268 in the like month of 1929.

Gross for the year ended with December was $180,900,804, and expenses $142,652,145, decreases of $28,830,151 and $23,934,265, respectively. Net for the 12 months, accordingly, was $38,348,658, which compared with $43,144,543 in the like period of 1929.

The following table shows gross revenues, expenses and net of the company for the month of December, and for the 12 months of the fiscal year ended December:

	DECEMBER		
	1930	1929	Decr.
Gross	$16,324,469	$15,518,232	* $806,237
Exp.	12,162,949	12,364,963	202,014
Net	$4,161,519	$3,153,268	*$1,008,251
	TWELVE MONTHS		
	1930	1929	Decr.
Gross	$180,900,804	$209,730,955	$28,830,151
Exp.	142,652,145	166,586,411	23,934,265
Net	$38,348,658	$43,144,543	$4,895,885

* Increase.

A. H. Elder Discusses Railway Taxation Problem

Proposals to place competition between railways and highway carriers on a fair basis should include some plan for reducing unduly heavy railway taxes as well as suggestions for taxing buses and trucks adequately for their use of the highways, according to Alexander H. Elder, general solicitor, Central of New Jersey. Mr. Elder expressed this view in an address on taxation before the Traffic Club of Newark, N. J., on January 22.

"A great deal has been recently said regarding equality of treatment by the public as between railroads and their competitors," Mr. Elder said. "Some have jumped at the conclusion that this means burdening buses and trucks with regulations and taxation so that their expenses and therefore their rates and fares must be raised to the point where traffic will flow back to the railroads..... Granting that the existing discrimination against the railroads must be alleviated, if they are to continue efficient, yet if the discrimination is to be treated along sane lines it must be done in part by relieving the railroads of their tax burden rather than solely by burdening highway traffic."

Mr. Elder's address was concerned mainly with railway taxes in New Jersey. He called attention to the decline in the number of industrial establishments and wage earners in that state since 1919 and, comparing these figures with similar statistics from other parts of the country, concluded that the industrial development of New Jersey has not kept pace with that of other sections. One reason for this, the speaker thought, was the great increase in railroad taxes in New Jersey. Railroad taxes, he continued, are "in the nature of a surtax that industry must pay in the form of freight rates." New Jersey, Mr. Elder said, leads all states in railroad taxes; its assessments on railroads rose from $720 a mile in 1900 to $9,165 a mile in 1928 or 1173 per cent, while railroad taxes in the country as a whole were rising 555 per cent or from $261 per mile in 1900 to $1,711 per mile in 1928. "New Jersey not only heads the list," he added, "but its taxes per mile of road are nearly twice as great as those of any other state."

The speaker also quoted statistics of railroad taxes in the country as a whole, pointing out that the increase of about $125,000,000 since 1920 means that "about one-eighth of the fair return on railroad value, which Congress and the Interstate Commerce Commission thought necessary to assure an efficient national transportation system, has been diverted by the states to local purposes."

"Instead of conflict over rates," he added, "would it not benefit the public more if shippers organizations and railroad managements joined hands with all other taxpayers in demanding a reduction in the common tax burden which in 1930 injected 6.6 cents into every dollar of freight charges?"

P. & W. Va. Completes Connellsville Extension

Completion of the largest piece of new railroad construction in the Eastern states in many years, the 38-mile Connellsville extension of the Pittsburgh & West Virginia, will be marked this week or next by an official inspection trip. The new line will go into operation on February 11, hauling the products of the Monongahela Valley coal and industrial community and serving several industries, the largest of which is the American Steel & Wire Company plant at Donora, Pa. The extension, which runs from Cochran's Mills, Pa., near Clairton, to Connellsville, where it joins the Western Maryland, cost about $15,000,000 and has been under construction for more than two years. It was described in detail in the *Railway Age* of August 16, 1930, page 320.

C. & W. I. Upheld in Dearborn Station Facility Use

The Illinois Commerce Commission on January 29 authorized the Chicago & Western Indiana to continue the use of 13 tracks crossing Plymouth court and Taylor street in Chicago and providing the railroad with lead tracks to mail and express facilities and suburban train platforms at the Dearborn station. This authorization disposes of an order of the city requiring the removal of the tracks from the streets on the ground that ordinances allowing their use had expired and of the contention of the city that the state commission has no jurisdiction over railroad-highway crossings within the city limits. The commission ordered the railroad to establish 24-hour flag service at the crossings, with two flagmen. The order of the city, if observed, would have deprived the railroad of the use of about half of the facilities at the Dearborn station.

Two-cent Fares

The Chicago & North Western has established a two-cent fare on seven sections of the system to be effective from February 1 to April 30. If the low fares are successful in increasing patronage during this period they will be extended to other parts of the system. The lines over which the fares will be effective are between Madison, Wis., and Platteville and Lancaster, between Green Bay and Laona, between Sterling, Ill., and Peoria; between Rochester, Minn., and Tracy, between Watertown, S. D. and Gettysburg, between Des Moines, Ia., and Algona, and between Norfolk, Neb. and Niobrara.

The adoption of the two-cent rate by western railroads was started in October, 1930, when the Texas & Pacific applied to the Railroad Commission of Texas for authority to establish low fares in coaches between Ft. Worth, Tex., and Big Spring. In the following month the railroads operating between Chicago and the Pacific Coast announced that they would establish, on January 1, three classes of fares between Chicago and the Pacific Coast, of which the lowest amounts to 2.3 cents a mile. The Texas-Mexican, in November, following the establishment of a two-cent rate on the Texas & Pacific applied to the Railroad Commission for permission to place a two-cent rate in effect between Laredo, Tex. and Corpus Christi. In December, the Chicago, Milwaukee, St. Paul & Pacific was granted permission by the Railroad Commission of Wisconsin, the Iowa Board of Railroad Commissioners and the Minnesota Railroad and Warehouse Commission to establish a two-cents-a-mile rate in those states for a three-months' period beginning January 1. In the same month the Quanah, Acme & Pacific applied to the Railroad Commission of Texas for permission to reduce its passenger fare to two cents.

The most extensive application of the low rate occurs on the St. Louis-San Francisco which recently received permission from the Interstate Commerce Commission to establish a two-cent fare good between all points on the system. In January the Missouri Pacific applied to the Railroad Commission of Texas for permission to establish a two-cent rate in rail motor coaches between Austin, Tex. and San Antonio. The Milwaukee, in January, extended its application of two-cent fares to certain lines in South Dakota, while the Mobile & Ohio filed tariffs with the Interstate Commerce Commission reducing fares on the system to two cents a mile to

(Continued on page 346)

Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1930

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1929.
Akron, Canton & Youngstown	Dec.	171	$139,412	$114	$146,146	$32,368	$19,106	$14,164	$56,244	$22,871	$144,522	98.9	$1,624	$25,589	$9,968	$5,065
	12 mos.	171	2,616,385	1,332	2,720,402	443,457	267,564	168,939	780,397	214,161	1,863,366	68.5	857,036	811,188	547,355	992,094
Atchison, Topeka & Santa Fe	Dec.	9,626	9,560,932	2,098,925	13,171,137	1,821,385	2,864,854	413,024	4,143,036	460,376	9,589,416	72.8	3,581,721	2,380,034	2,282,442	2,523,317
	12 mos.	9,629	139,884,059	28,539,138	185,261,863	27,777,738	37,202,839	5,029,877	54,903,986	5,387,018	129,875,090	70.1	55,386,773	38,831,969	38,443,607	59,149,787
Gulf, Colorado & Santa Fe	Dec.	1,976	1,579,487	119,396	1,821,444	256,114	367,644	58,229	572,371	79,292	1,272,949	69.9	548,495	443,048	328,165	634,603
	12 mos.	1,958	22,397,877	1,627,153	25,510,585	4,394,870	5,044,998	690,679	7,775,908	896,783	18,603,125	72.9	6,907,460	5,701,655	4,168,968	6,033,220
Panhandle & Santa Fe	Dec.	1,718	871,067	83,528	1,042,568	262,044	240,147	21,754	280,614	43,657	829,565	79.6	213,003	126,253	12,294	154,959
	12 mos.	1,615	13,678,534	1,013,880	15,648,596	3,287,203	3,154,966	244,132	4,413,908	473,364	11,442,407	73.1	4,206,189	3,645,654	2,263,892	4,442,379
Atlanta & West Point	Dec.	93	106,145	36,924	167,309	28,251	32,537	11,040	61,579	12,224	148,779	88.9	18,530	14,499	374	—2,201
	12 mos.	93	1,560,705	460,669	2,339,981	329,460	432,412	141,982	934,070	146,936	2,038,614	87.1	301,367	157,224	14,502	200,436
Western of Alabama	Dec.	133	123,123	40,986	182,743	20,283	42,292	11,443	61,473	12,032	149,734	81.9	33,009	20,290	29,540	43,135
	12 mos.	133	1,759,171	495,801	2,508,623	312,525	523,767	145,692	889,297	152,712	2,067,018	82.4	441,605	269,465	325,919	434,117
Atlanta, Birmingham & Coast	Dec.	639	250,798	15,052	304,819	80,905	76,710	26,925	146,438	19,054	361,965	118.7	—57,146	—77,708	—96,124	—58,082
	12 mos.	639	3,440,443	204,063	4,098,580	979,939	918,150	335,969	1,752,054	238,492	4,354,938	106.3	—256,358	—447,921	—659,657	—257,461
Atlantic Coast Line	Dec.	5,160	4,050,431	736,463	5,402,472	722,147	1,061,810	170,710	1,910,714	171,590	4,093,233	75.8	1,309,239	851,834	686,527	956,698
	12 mos.	5,156	46,428,030	10,538,340	63,019,957	9,787,465	12,513,107	2,015,053	22,643,244	2,099,809	49,685,460	78.8	13,334,497	7,779,646	7,241,304	12,874,207
Charleston & Western Carolina	Dec.	342	187,693	6,523	202,618	34,182	34,654	6,710	86,871	6,241	168,658	83.2	33,960	16,067	20,496	31,880
	12 mos.	342	2,604,220	88,924	2,795,654	567,091	444,445	86,781	1,061,246	87,736	2,247,308	80.4	548,346	327,210	299,006	460,157
Baltimore & Ohio	Dec.	5,653	11,200,441	1,427,717	13,798,818	1,105,232	2,607,611	474,029	5,161,854	656,591	10,164,998	73.7	3,633,820	3,174,128	3,067,790	2,441,903
	12 mos.	5,657	173,706,337	18,567,622	206,660,435	22,442,383	41,693,160	6,269,933	72,500,106	8,145,895	153,142,374	74.1	53,518,061	43,162,624	40,248,614	49,184,110
Baltimore & Ohio Chic. Term	Dec.	85	.....	.....	267,298	Cr. 12,536	40,914	2,852	139,938	20,155	197,769	74.0	69,529	141,554	203,397	109,423
	12 mos.	85	.....	.....	3,851,975	517,156	471,163	29,068	1,932,482	222,059	3,238,306	84.1	613,669	91,802	1,371,081	1,426,347
Staten Island Rapid Transit	Dec.	23	57,288	113,327	178,474	8,962	13,806	2,089	103,808	16,058	144,723	81.1	33,751	17,659	5,997	77,226
	12 mos.	23	796,785	1,534,074	2,448,959	198,699	188,345	25,995	1,212,677	203,994	1,829,710	74.7	619,249	409,737	298,132	460,515
Bangor & Aroostook	Dec.	619	597,887	50,646	681,920	126,846	178,144	5,071	168,369	24,948	502,811	73.7	179,109	126,479	134,676	118,600
	12 mos.	619	7,442,917	553,019	8,365,757	1,434,511	1,503,103	66,968	1,997,747	319,128	5,350,238	64.0	3,015,519	2,314,202	2,335,907	2,277,600
Belt Ry. Co. of Chicago	Dec.	57	.....	.....	455,015	16,603	37,999	3,028	206,690	9,647	273,967	60.2	181,048	126,262	143,223	146,983
	12 mos.	57	.....	.....	6,803,387	574,595	715,378	47,538	3,201,310	139,297	4,678,118	68.8	2,125,269	1,476,023	1,807,727	1,798,069
Bessemer & Lake Erie	Dec.	227	418,286	3,371	434,690	102,528	351,871	13,433	209,387	40,714	719,036	165.4	—284,346	—197,650	—188,402	102,512
	12 mos.	227	14,458,741	55,554	14,712,458	1,285,951	3,991,545	180,028	3,345,611	438,243	9,270,670	63.0	5,441,788	4,767,620	4,760,684	7,444,665
Bingham & Garfield	Dec.	33	26,247	.....	26,875	6,735	3,663	1,641	Cr. 6,767	4,506	9,893	36.8	16,982	14,320	32,105	14,379
	12 mos.	33	356,858	88	367,195	79,825	80,416	18,649	83,668	59,075	322,937	87.9	44,258	—24,369	174,428	244,296
Boston & Maine	Dec.	2,089	3,268,007	1,242,563	5,371,276	912,335	737,324	83,429	1,899,140	207,350	3,861,081	71.9	1,510,195	1,228,029	993,809	609,470
	12 mos.	2,090	45,241,697	14,399,500	69,278,336	11,668,430	10,213,945	1,078,823	24,999,189	2,615,301	50,865,607	73.4	18,412,729	14,874,103	12,251,159	12,642,198
Brooklyn Eastern Dist. Term	Dec.	11	85,919	.....	87,645	6,532	13,214	24	34,510	6,985	61,265	69.9	26,380	20,057	20,057	26,811
	12 mos.	11	1,287,335	.....	1,311,112	116,318	169,638	4,401	435,699	68,854	794,810	60.6	516,202	434,337	434,337	453,842
Buffalo & Susquehanna	Dec.	253	139,770	535	157,641	12,566	40,890	2,231	50,458	10,002	114,893	72.9	42,748	41,309	57,763	44,183
	12 mos.	253	1,659,831	7,571	1,826,792	309,448	512,610	24,825	538,770	99,777	1,484,176	81.2	342,616	330,208	473,084	344,329
Buffalo, Rochester & Pittsburgh	Dec.	601	1,030,239	54,010	1,132,614	122,340	271,339	40,482	480,804	44,364	958,481	84.6	174,133	173,994	197,330	188,949
	12 mos.	601	14,160,378	651,093	15,364,002	1,967,660	3,998,637	446,877	5,975,602	524,855	12,922,537	84.1	2,441,465	2,075,419	2,227,505	2,910,286
Burlington-Rock Island	Dec.	367	169,447	3,743	180,687	69,269	22,231	7,208	72,932	14,973	186,231	103.1	—5,544	—15,148	—50,818	—317,541
	12 mos.	367	2,052,350	52,817	2,197,609	1,165,328	334,924	80,338	879,902	182,336	2,527,603	115.0	—329,994	—427,286	—795,925	—402,893
Canadian Pacific Lines in Maine	Dec.	233	200,234	33,654	245,631	43,273	68,547	8,184	118,963	3,966	242,859	98.8	2,772	—1,672	—33,251	1,220
	12 mos.	233	1,985,631	350,643	2,505,954	588,062	616,388	93,691	1,113,812	50,777	2,462,656	98.2	43,298	—100,146	—336,780	—282,820
Canadian Pacific Lines in Vermont	Dec.	85	68,043	22,917	111,345	18,726	27,988	2,112	80,638	2,772	132,236	118.7	—20,891	—25,071	—55,462	—22,593
	12 mos.	85	1,152,080	361,077	1,790,949	289,182	375,470	24,526	1,036,051	30,842	1,755,984	98.0	34,965	—13,635	—382,356	—264,489
Central of Georgia	Dec.	1,944	1,113,990	188,816	1,464,458	124,402	252,989	61,524	654,220	81,437	1,180,182	80.6	284,276	251,101	237,785	373,907
	12 mos.	1,944	16,288,838	2,725,868	21,082,429	2,192,546	3,504,784	816,472	8,505,211	983,715	16,123,140	76.5	4,959,289	3,628,263	3,668,811	4,508,457
Central New Jersey	Dec.	692	2,718,977	601,394	3,618,285	280,840	743,195	55,186	1,529,265	131,227	2,763,570	76.4	854,715	404,421	307,772	737,504
	12 mos.	692	39,924,298	8,431,086	51,753,823	4,958,726	10,799,653	713,346	19,845,774	1,540,382	38,167,251	73.7	13,586,572	8,542,137	7,152,607	9,367,044
Central Vermont	Dec.	462	401,203	69,720	526,345	97,963	91,269	17,088	242,848	27,220	478,085	90.8	48,260	37,347	52,934	71,808
	12 mos.	465	5,852,855	980,548	7,584,733	1,321,839	1,242,065	218,716	3,207,829	302,986	6,316,992	83.3	1,267,741	1,079,300	1,270,775	1,805,843
Chesapeake & Ohio	Dec.	3,119	9,233,705	426,247	10,051,922	1,189,030	1,947,491	170,245	2,720,142	373,842	6,426,090	63.9	3,625,832	2,706,317	2,765,888	3,362,024
	12 mos.	3,113	125,833,666	5,529,702	137,230,375	18,592,519	26,836,471	2,011,614	34,977,342	4,276,459	86,966,517	63.4	50,263,858	39,952,338	40,523,227	43,939,553
Chicago & Alton	Dec.	1,028	1,077,497	336,555	1,630,369	163,357	486,733	75,909	760,142	111,062	1,608,274	98.6	22,095	—97,881	—288,861	163,395
	12 mos.	1,028	17,343,839	4,380,324	24,265,192	3,409,189	5,692,256	927,005	9,514,394	820,488	20,506,554	84.5	3,758,638	2,360,189	64,301	3,278,828
Chicago & Eastern Illinois	Dec.	946	1,019,265	202,941	1,370,598	57,592	*5,045,867	55,376	644,494	64,174	5,881,916	429.1	—4,511,318	—4,675,198	—4,815,441	96,340
	12 mos.	946	15,387,823	2,618,533	19,784,299	2,210,562	9,280,045	943,137	8,306,537	832,236	21,701,496	109.7	—1,917,197	—3,606,086	—5,505,969	2,209,033

* Includes $4,700,000 special retirement of equipment.

Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1930—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equip. ment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1929.
Chicago & Illinois Midland	Dec.	131	$272,244	$3,907	$286,106	$26,806	$52,074	$20,341	$88,206	$22,765	$202,412	70.7	$83,694	$73,414	$57,326	$70,548
	12 mos.	131	2,982,228	52,788	3,155,470	346,635	622,438	254,059	898,036	292,274	2,402,612	76.1	752,858	650,642	565,496	563,572
Chicago & North Western	Dec.	8,458	5,963,034	1,481,147	8,726,872	1,256,387	1,534,200	195,499	3,708,145	383,151	7,116,765	81.6	1,610,107	1,335,844	1,135,523	66,333
	12 mos.	8,458	95,922,883	19,366,435	130,030,474	19,195,308	24,389,363	2,601,531	49,853,180	4,621,582	101,091,424	77.7	28,939,050	20,455,027	17,432,851	26,220,149
Chicago, Burlington & Quincy	Dec.	9,324	8,524,999	1,119,342	10,879,800	1,215,909	2,631,915	257,501	3,791,034	360,999	8,338,685	76.6	2,541,115	1,849,676	1,459,521	2,536,036
	12 mos.	9,332	111,157,128	15,360,186	141,379,422	20,311,640	22,553,488	3,456,600	46,922,911	4,426,143	98,877,814	69.9	42,501,608	31,279,532	27,956,064	35,357,963
Chicago Great Western	Dec.	1,495	1,394,863	145,166	1,685,205	181,469	148,274	79,089	628,698	62,908	1,099,638	65.3	585,567	498,781	274,206	221,056
	12 mos.	1,495	19,114,782	1,977,957	22,830,321	3,345,432	2,772,638	997,809	8,776,051	654,441	16,580,399	72.6	6,249,922	5,162,653	2,853,179	2,801,534
Chicago, Indianapolis & Louisville	Dec.	647	820,672	109,855	1,047,515	77,723	238,448	34,668	375,842	33,209	761,714	72.7	285,801	203,443	93,967	237,256
	12 mos.	646	11,772,669	1,499,919	14,725,077	1,688,646	3,087,111	459,383	5,446,330	422,707	11,188,393	76.0	3,536,684	2,591,732	1,138,760	2,603,564
Chicago, Mil., St. Paul & Pacific	Dec.	11,325	7,776,034	1,001,245	9,927,508	1,148,486	2,178,512	287,580	4,052,930	344,649	8,049,514	81.1	1,877,994	1,248,004	833,475	1,456,616
	12 mos.	11,313	115,638,093	12,681,684	142,569,632	22,354,246	28,181,134	3,824,992	53,124,009	4,411,557	112,295,805	78.8	30,273,827	20,753,597	15,954,548	26,274,323
Chicago River & Indiana	Dec.	20	.....	.....	446,497	40,280	41,229	1,705	149,667	19,144	252,025	56.4	194,472	158,819	307,503	265,294
	12 mos.	20	.....	.....	6,124,611	583,280	529,829	18,409	2,133,744	223,014	3,488,276	57.0	2,636,335	2,294,999	3,204,483	3,659,575
Chicago, Rock Island & Pacific	Dec.	7,592	6,082,136	1,147,142	8,103,460	796,854	1,546,494	228,799	3,218,577	340,989	6,238,052	77.0	1,865,408	1,329,974	956,241	2,000,881
	12 mos.	7,592	90,702,361	14,633,217	116,384,319	14,428,094	20,623,623	2,988,431	43,175,316	4,117,954	86,260,291	74.1	30,124,028	23,194,595	18,063,976	21,971,128
Chicago, Rock Island & Gulf	Dec.	625	390,885	46,515	479,100	63,983	44,070	20,286	161,348	20,619	313,865	65.5	165,237	149,353	137,665	298,247
	12 mos.	591	5,509,556	662,367	6,695,591	891,718	600,875	251,612	2,272,584	257,290	4,291,467	64.1	2,404,124	2,102,283	1,683,831	2,877,781
Chic., St. Paul, Minn. & Omaha	Dec.	1,736	1,296,409	223,329	1,655,196	290,624	463,516	38,197	831,669	89,463	1,727,399	104.4	—72,203	—161,997	—254,639	—277,121
	12 mos.	1,740	19,264,179	3,202,983	24,436,288	3,731,981	4,788,218	487,716	10,362,239	1,029,154	20,516,903	84.0	3,919,385	2,640,885	1,659,994	2,968,733
Clinchfield Railroad	Dec.	309	464,575	9,417	482,859	57,930	135,005	20,203	107,234	16,451	337,090	69.8	145,769	69,765	152,525	209,123
	12 mos.	309	5,784,098	110,016	6,016,063	678,241	1,517,094	251,314	1,339,007	213,674	3,998,345	66.5	2,017,718	1,181,468	1,927,195	2,713,355
Colorado & Southern	Dec.	1,037	719,598	51,031	854,352	109,885	153,458	14,507	298,707	41,709	620,057	72.6	234,295	187,798	176,841	234,204
	12 mos.	1,038	8,546,733	827,700	10,302,742	1,529,093	1,965,478	189,491	3,618,581	500,395	7,837,951	76.1	2,464,791	1,647,536	1,384,364	1,774,618
Ft. Worth & Denver City	Dec.	696	735,524	98,271	693,102	73,908	126,002	20,143	227,439	41,942	490,856	70.8	202,246	171,204	170,129	269,588
	12 mos.	696	7,481,965	1,286,080	9,484,711	1,266,764	1,649,979	251,608	3,009,730	471,501	6,675,898	70.4	2,808,813	2,291,388	2,163,713	3,503,073
Wichita Valley	Dec.	270	73,077	1,900	78,121	12,701	4,419	65	27,449	1,704	46,338	59.3	31,783	25,899	18,110	16,234
	12 mos.	271	794,863	31,618	879,461	273,758	61,987	565	347,379	21,156	705,286	80.2	174,175	87,518	—122,164	284,298
Columbus & Greenville	Dec.	167	101,109	11,972	121,304	24,400	20,568	4,409	39,500	13,432	98,409	81.1	22,895	10,791	11,639	32,335
	12 mos.	167	1,356,088	145,905	1,598,382	400,048	239,469	51,162	570,044	144,935	1,398,072	87.5	200,310	142,287	116,976	265,507
Conemaugh & Black Lick	Dec.	20	23,055	....	48,961	Cr. 3,425	14,707	418	37,237	5,044	53,981	110.3	—5,020	—6,679	—2,806	21,683
	12 mos.	20	777,447	.....	1,390,983	138,595	238,188	9,082	794,183	45,034	1,225,082	88.1	165,901	156,242	188,797	403,746
Delaware & Hudson	Dec.	882	2,508,723	175,785	2,863,457	656,715	717,874	52,671	1,077,008	151,663	2,662,442	93.0	201,015	115,818	119,311	639,514
	12 mos.	881	32,730,584	2,732,449	37,906,143	5,787,394	8,825,638	695,823	13,447,919	1,887,614	30,735,472	81.1	7,170,675	5,731,049	5,868,962	8,164,740
Delaware, Lackawanna & Western	Dec.	998	4,031,887	795,821	5,557,855	465,353	1,091,469	136,400	2,379,803	177,374	4,293,771	77.3	1,264,084	764,149	782,856	1,616,770
	12 mos.	998	50,786,462	10,115,126	69,661,490	6,788,470	12,879,781	1,715,242	28,602,066	2,124,843	52,612,853	75.5	17,048,637	10,963,397	11,159,923	17,508,887
Denver & Rio Grande Western	Dec.	2,524	1,951,939	151,059	2,281,300	198,104	466,844	62,391	731,624	92,231	1,565,947	68.6	715,353	513,887	523,666	590,656
	12 mos.	2,549	24,951,021	2,594,860	29,747,537	3,862,180	5,577,686	727,410	9,179,737	1,091,383	20,693,801	69.6	9,053,736	6,878,640	6,940,942	8,528,676
Denver & Salt Lake	Dec.	232	250,568	11,411	277,165	29,287	46,771	1,923	43,664	21,491	143,136	51.6	134,029	123,988	131,814	234,759
	12 mos.	232	2,835,677	149,735	3,197,282	626,161	641,779	26,836	513,896	180,930	1,974,951	61.8	1,222,331	1,037,188	1,123,753	1,679,287
Detroit & Mackinac	Dec.	242	45,994	7,057	61,933	11,129	15,599	1,426	27,712	2,443	58,312	94.2	3,621	—4,949	—3,868	—42,226
	12 mos.	249	887,484	85,393	1,082,774	302,397	196,820	24,144	407,447	66,388	959,901	88.7	122,873	31,192	27,683	230,744
Detroit & Toledo Shore Line	Dec.	50	298,799	.....	303,303	40,130	27,199	7,994	75,590	Cr. 5,099	145,813	48.1	157,490	135,148	74,969	29,823
	12 mos.	50	3,667,443	.....	3,725,251	479,883	361,701	91,057	959,986	116,620	2,007,577	53.9	1,717,674	1,443,601	707,467	739,901
Detroit Terminal	Dec.	19	.....	.....	80,305	7,832	9,475	.....	43,925	3,984	65,216	81.2	15,089	—1,306	1,402	—26,329
	12 mos.	19	.....	.....	1,361,663	192,004	139,360	84	705,419	52,210	1,089,077	80.0	272,586	89,695	102,036	565,274
Detroit, Toledo & Ironton	Dec.	509	542,265	1,431	557,741	72,060	108,539	13,036	199,332	39,649	431,062	77.3	126,679	129,131	109,990	—54,608
	12 mos.	510	9,934,468	19,423	10,163,777	1,372,601	1,344,710	159,910	2,848,886	414,745	6,130,707	60.3	4,033,070	3,500,312	3,156,870	4,501,659
Duluth, Missabe & Northern	Dec.	564	96,259	5,774	131,099	173,870	346,294	4,113	217,164	102,683	842,516	642.7	—711,417	—675,958	—654,184	—627,592
	12 mos.	567	18,450,908	74,878	21,007,438	2,882,046	3,689,271	49,026	4,358,344	570,921	11,546,754	55.0	9,460,684	7,666,469	7,712,410	13,129,058
Duluth, Winnipeg & Pacific	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....		.....	.....	.....	.....
Elgin, Joliet & Eastern	Dec.	447	1,275,280	2.	1,403,976	208,419	365,468	17,896	610,400	58,811	1,260,705	89.8	143,271	—6,061	—121,247	—85,632
	12 mos.	452	19,754,241	2,484	21,807,616	2,681,519	3,610,048	191,244	8,422,863	650,823	15,544,545	71.3	6,263,071	4,875,585	3,014,144	5,452,263
Erie Railroad	Dec.	2,046	5,259,949	732,706	6,603,620	444,896	1,763,955	166,350	2,790,916	314,731	5,510,403	83.4	1,093,217	844,427	879,666	1,084,163
	12 mos.	2,046	77,755,404	9,395,690	95,372,547	11,529,347	21,476,741	2,111,547	37,021,850	3,605,589	76,147,961	79.8	19,224,586	14,738,818	13,689,974	19,084,600

Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1930—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equip. ment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1929.
Chicago & Erie	Dec.	269	$891,782	$43,399	$1,008,173	$169,678	$132,294	$28,493	$290,985	$44,249	$664,969	66.0	$343,204	$314,400	$25,346	—$92,468
	12 mos.	269	11,988,830	605,643	13,623,463	1,749,389	1,668,086	350,189	4,047,926	518,920	8,321,287	61.1	5,302,176	4,689,625	1,337,218	2,377,438
New Jersey & New York	Dec.	45	20,468	87,951	113,330	6,352	25,893	1,356	62,684	3,602	99,887	88.1	13,443	10,094	—19,153	—11,288
	12 mos.	45	269,910	1,093,281	1,417,471	180,522	261,701	18,698	742,698	44,292	1,247,862	88.0	169,609	116,440	—244,962	—260,092
N. Y., Susquehanna & Western	Dec.	131	301,482	35,963	370,437	12,262	60,680	4,712	180,236	12,909	270,788	73.1	99,649	67,684	32,132	76,450
	12 mos.	131	3,822,640	463,861	4,709,619	592,500	568,040	58,057	2,011,152	142,353	3,371,792	71.6	1,337,827	958,416	628,607	647,256
Florida East Coast	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	.....	.....	.....	.....
Fort Smith & Western	Dec.	249	80,260	5,516	91,790	15,948	14,102	4,965	37,379	6,293	77,782	84.7	14,008	9,917	2,224	19,169
	12 mos.	249	1,177,723	76,093	1,332,486	255,386	255,236	65,403	463,103	77,165	1,105,900	83.0	226,586	177,453	53,855	121,031
Galveston Wharf	Dec.	13	.....	.....	180,301	31,915	4,813	5,532	29,983	16,040	102,468	56.8	77,833	57,114	57,202	—325
	12 mos.	13	.....	.....	1,882,849	426,950	67,862	50,744	350,022	89,442	1,177,883	62.6	704,966	426,367	429,364	608,617
Georgia R. R.	Dec.	328	247,393	38,177	324,078	29,496	59,278	20,815	157,851	24,052	291,733	90.0	32,345	30,189	51,887	77,069
	12 mos.	328	3,785,485	483,493	4,642,823	517,317	883,208	265,971	2,048,409	276,032	3,988,605	85.9	654,218	552,349	729,558	938,211
Georgia & Florida	Dec.	463	92,543	4,793	106,196	29,073	21,995	9,703	53,676	6,177	120,298	113.3	—14,102	—2,869	—3,398	—18,203
	12 mos.	487	1,544,808	62,986	1,695,137	386,121	273,188	122,445	624,128	95,406	1,502,810	88.7	192,327	116,433	89,606	113,955
Grand Trunk Western	Dec.	1,019	1,445,951	119,693	1,723,059	247,166	298,408	21,066	877,696	97,811	1,554,460	90.2	168,599	50,444	—179,114	—407,749
	12 mos.	1,019	22,453,664	1,989,886	26,243,106	3,948,788	4,824,727	790,193	11,085,228	1,259,093	22,045,869	84.0	4,197,237	2,571,168	294,368	5,805,122
Atlantic & St. Lawrence	Dec.	166	104,657	20,089	149,388	45,135	35,166	511	74,376	10,089	166,813	111.6	—17,425	—30,932	—94,330	—8,149
	12 mos.	166	1,493,209	245,108	1,956,710	420,281	495,861	65,299	1,028,715	111,936	2,139,190	109.3	—182,480	—346,720	—916,952	—919,512
Great Northern	Dec.	8,370	4,808,391	671,074	6,278,901	762,592	1,568,010	244,856	2,550,585	180,409	5,307,732	84.5	971,169	457,993	346,273	1,950,135
	12 mos.	8,366	85,797,850	9,000,087	104,996,076	13,598,876	18,544,614	2,912,531	33,908,017	2,801,602	72,565,878	69.1	32,430,198	23,707,755	21,912,508	32,457,523
Green Bay & Western	Dec.	234	131,968	2,549	137,864	8,418	31,828	6,484	36,703	3,717	86,704	62.9	51,160	36,426	30,430	50,737
	12 mos.	234	1,673,199	31,771	1,769,231	296,484	278,580	75,773	623,163	36,568	1,309,698	74.0	459,533	348,724	289,926	353,743
Gulf & Ship Island	Dec.	307	108,672	22,891	149,046	37,197	31,868	4,148	78,447	6,517	159,231	106.8	—10,185	—6,024	—19,279	—32,817
	12 mos.	307	1,965,017	321,998	2,577,151	545,831	401,679	56,690	1,057,444	80,344	2,174,927	84.4	402,224	44,889	—118,761	—93,006
Gulf, Mobile & Northern	Dec.	733	322,128	19,493	361,586	52,348	68,965	33,636	149,393	26,791	331,388	91.65	30,198	47,118	19,925	77,564
	12 mos.	733	5,384,462	253,840	5,897,612	991,588	956,255	359,178	1,954,497	301,797	4,566,789	77.43	1,330,823	1,004,997	631,118	1,429,948
Illinois Central	Dec.	5,018	7,169,281	1,350,312	9,283,762	768,824	1,772,419	252,182	3,690,141	359,249	6,898,132	74.3	2,385,630	2,608,187	2,605,944	2,180,282
	12 mos.	5,018	97,951,868	16,807,419	125,093,213	13,684,713	27,076,787	3,126,650	47,167,017	4,318,842	96,295,503	77.0	28,797,710	21,489,686	20,907,875	24,447,078
Yazoo & Mississippi Valley	Dec.	1,694	1,293,421	176,674	1,587,529	250,021	247,051	41,304	656,023	65,044	1,262,965	79.6	324,564	301,212	195,996	470,833
	12 mos.	1,704	19,230,175	2,561,584	23,296,348	3,328,931	3,759,688	534,422	9,009,095	776,876	17,460,138	74.9	5,836,210	3,964,125	2,685,202	3,274,932
Illinois Central System	Dec.	6,712	8,462,702	1,526,986	10,871,291	1,018,845	2,019,470	293,486	4,346,164	424,293	8,161,097	75.1	2,710,194	2,909,399	2,801,940	2,653,547
	12 mos.	6,722	117,232,122	19,385,264	148,455,905	17,013,644	30,858,546	3,661,072	56,210,800	5,096,516	113,813,198	76.7	34,642,707	25,457,255	23,596,521	27,743,259
Illinois Terminal	Dec.	554	450,302	99,361	577,425	58,669	76,149	20,861	198,321	41,130	394,018	68.24	183,407	155,438	127,588	120,751
	12 mos.	554	5,749,400	1,377,231	7,490,935	931,714	992,450	235,413	2,563,350	496,710	5,198,237	69.39	2,292,698	1,927,747	1,451,088	1,605,289
Kansas City Southern	Dec.	784	801,160	57,977	983,446	138,283	213,124	50,927	388,949	95,584	890,628	90.6	92,818	82,323	51,932	288,225
	12 mos.	784	14,095,655	794,757	16,572,718	1,949,659	2,873,976	743,474	5,047,539	948,976	11,605,448	70.0	4,967,270	3,889,554	3,260,588	4,165,885
Texarkana & Ft. Smith	Dec.	99	147,770	3,960	167,142	24,350	12,850	7,589	50,742	13,348	111,084	66.5	56,058	56,405	44,364	77,423
	12 mos	99	2,194,447	59,699	2,523,976	311,566	249,869	104,322	655,507	150,723	1,514,751	60.0	1,009,225	913,363	510,190	983,036
Kansas, Oklahoma & Gulf	Dec.	326	207,190	1,963	213,968	31,653	29,695	18,197	65,880	16,059	156,303	73.0	57,665	55,673	35,714	110,392
	12 mos.	326	3,009,610	22,424	3,093,859	355,660	308,857	188,283	754,192	142,188	1,735,676	56.1	1,358,183	1,113,923	863,883	1,297,773
Lake Superior & Ishpeming	Dec.	160	41,532	821	46,161	24,956	33,390	2,021	35,740	11,085	107,192	232.2	—61,031	—75,522	—76,711	—78,997
	12 mos.	160	1,946,938	9,116	2,257,468	408,391	342,905	8,625	531,099	82,082	1,372,557	60.8	884,911	550,706	516,530	1,219,738
Lake Terminal	Dec.	12	.....	.....	49,201	9,411	8,170	.....	32,810	1,882	52,273	106.2	—3,072	—6,673	—9,539	—8,378
	12 mos.	12	.....	.....	985,085	170,978	139,720	.....	501,191	26,819	838,708	85.1	146,377	95,899	42,045	179,990
Lehigh & Hudson River	Dec.	96	164,884	758	174,727	19,981	31,394	3,138	71,909	13,238	139,640	79.9	35,097	20,115	4,146	38,338
	12 mos.	96	2,122,754	12,151	2,254,087	280,859	365,973	40,623	816,682	123,500	1,627,617	72.2	626,470	436,987	242,708	477,609
Lehigh & New England	Dec.	216	390,040	800	393,896	46,318	76,991	4,956	136,855	17,280	282,308	71.7	111,588	157,615	158,459	183,474
	12 mos.	216	4,989,238	10,282	5,065,787	628,182	1,006,579	76,663	1,754,387	318,211	3,783,691	74.7	1,282,096	1,172,949	1,097,774	1,183,176
Lehigh Valley	Dec.	1,361	3,727,989	421,927	4,540,446	514,830	1,006,676	132,968	2,003,439	138,871	3,822,298	84.2	718,148	945,544	817,173	993,567
	12 mos.	1,361	50,287,945	5,512,486	60,664,188	5,925,266	13,198,354	1,699,014	25,285,944	1,706,824	48,144,655	79.4	12,519,533	9,827,189	8,537,808	12,938,556
Louisiana & Arkansas	Dec.	608	401,611	14,197	440,347	62,381	52,572	23,384	142,664	25,609	307,290	69.8	133,057	90,643	79,649	85,878
	12 mos.	617	6,441,490	220,259	6,980,607	1,039,075	1,040,344	266,501	2,065,944	315,248	4,727,402	67.7	2,253,205	1,689,147	1,264,387	1,343,838
Louisiana, Arkansas & Texas	Dec.	202	54,943	1,568	59,233	13,385	15,003	6,085	30,366	5,080	69,911	118.0	—10,678	—19,699	—17,006	—6,462
	12 mos.	203	854,109	23,207	913,927	253,959	169,083	41,927	404,285	62,279	930,428	101.8	—16,501	—69,743	—185,703	—169,294
Louisville & Nashville	Dec.	5,271	6,982,070	891,427	8,493,578	1,217,860	1,971,043	248,281	2,928,463	359,827	6,762,966	79.6	1,730,612	1,306,079	1,269,467	2,176,626
	12 mos.	5,251	93,401,691	11,637,478	112,440,985	17,135,378	27,389,404	2,904,555	40,207,711	4,402,501	92,493,837	82.3	19,947,148	13,696,774	14,006,913	20,874,750

Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1930—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1929.
Maine Central	Dec.	1,121	$1,083,441	$206,330	$1,436,310	$151,408	$224,568	$15,220	$550,101	$50,859	$991,552	69.0	$444,756	$432,630	$311,910	$292,251
	12 mos.	1,121	14,550,947	2,706,727	18,992,373	2,839,347	3,588,728	203,085	7,087,776	605,268	14,345,945	75.5	4,646,428	3,580,980	3,000,727	3,680,319
Midland Valley	Dec.	363	160,068	4,457	171,312	37,160	28,313	7,824	59,500	15,312	145,598	85.0	25,714	23,919	11,169	85,693
	12 mos.	363	2,845,075	66,172	3,007,508	463,906	353,573	69,173	761,624	153,962	1,793,100	59.6	1,214,408	1,038,475	837,307	1,052,904
Minneapolis & St. Louis	Dec.	1,627	802,080	47,990	910,875	98,781	216,660	38,101	465,878	44,204	863,160	94.8	47,715	—13,883	—36,744	33,034
	12 mos.	1,627	11,392,219	578,492	12,725,671	1,646,743	2,507,176	449,363	5,688,939	533,186	10,827,661	85.1	1,898,010	1,141,709	546,695	1,867,016
Minneapolis, St. Paul & S. S. Marie	Dec.	4,379	1,951,115	228,045	2,419,134	396,784	586,635	79,801	1,101,471	123,649	2,296,107	94.9	123,027	—102,050	—260,317	327,630
	12 mos.	4,390	33,142,170	3,392,898	39,892,858	5,891,603	7,776,065	957,521	14,950,474	1,495,202	31,295,867	78.4	8,596,991	5,803,314	3,966,614	8,589,182
Duluth, South Shore & Atlantic	Dec.	573	172,923	31,051	225,618	42,657	49,962	7,743	118,367	9,259	230,501	102.2	—4,883	—35,370	—40,765	5,777
	12 mos.	573	3,029,703	402,648	3,749,601	708,588	716,893	99,048	1,614,600	125,442	3,288,301	87.7	461,300	54,885	—40,417	412,569
Spokane International	Dec.	163	48,697	5,215	59,765	10,404	6,614	3,843	27,064	5,883	54,516	91.2	5,249	447	—4,283	12,753
	12 mos.	163	799,861	71,695	944,144	196,828	86,712	42,053	333,465	71,768	741,433	78.5	202,711	142,472	75,594	243,862
Mississippi Central	Dec.	150	81,264	3,192	87,375	19,354	16,582	9,526	26,953	6,797	79,085	90.5	8,290	9,255	5,643	29,854
	12 mos.	150	1,218,425	55,158	1,317,572	234,608	252,023	118,298	381,163	95,675	1,095,644	83.2	221,928	158,850	131,298	377,384
Missouri & North Arkansas	Dec.	364	84,645	3,547	96,105	36,656	14,999	10,823	49,183	8,593	120,146	125.0	—24,041	—26,442	—36,494	—24,665
	12 mos.	364	1,474,171	67,259	1,632,445	396,284	206,295	120,013	635,791	99,302	1,457,365	89.3	175,080	145,780	—14,918	11,450
Missouri-Illinois	Dec.	202	112,868	1,352	116,669	14,229	25,464	3,705	38,207	6,053	87,133	74.7	29,536	29,101	15,813	—28,708
	12 mos.	202	1,760,763	17,780	1,814,371	285,523	384,609	41,874	535,564	78,047	1,323,449	72.9	490,922	416,501	295,792	512,755
Missouri-Kansas-Texas Lines	Dec.	3,188	2,780,365	498,986	3,623,479	277,902	338,136	126,345	1,057,741	167,092	1,983,053	54.7	1,640,426	1,504,340	1,259,964	1,307,723
	12 mos.	3,188	36,862,328	5,046,263	45,948,859	5,532,388	7,045,201	1,490,865	14,017,282	2,000,300	30,225,003	65.8	15,723,856	13,353,376	10,650,081	12,566,092
Missouri Pacific	Dec.	7,450	6,645,612	717,741	8,160,166	938,731	1,133,500	287,609	3,236,059	373,856	5,921,094	72.6	2,239,072	1,800,183	1,537,724	1,376,307
	12 mos.	7,451	99,779,357	10,210,815	120,187,689	17,928,953	20,851,200	3,532,231	42,519,953	4,543,357	89,009,547	74.1	31,178,142	25,715,488	20,790,036	24,554,185
Gulf Coast Lines	Dec.	1,026	908,330	97,652	1,096,541	111,976	215,410	40,679	372,545	63,181	804,914	73.40	291,627	239,838	186,071	293,368
	12 mos.	1,026	13,168,428	1,327,770	15,428,421	2,393,130	2,724,165	534,964	4,162,727	747,292	10,519,579	68.18	4,908,842	4,322,877	3,332,872	3,156,096
International-Great Northern	Dec.	1,159	774,476	129,191	1,038,044	140,361	253,563	38,035	507,845	68,524	1,007,592	97.07	30,452	—19,813	—78,619	140,034
	12 mos.	1,159	11,845,472	1,657,176	15,072,347	2,403,794	2,739,843	497,391	6,283,680	847,748	12,854,740	85.29	2,217,607	1,687,042	727,783	2,266,945
San Antonio, Uvalde & Gulf	Dec.	318	130,131	11,369	152,416	18,715	18,408	5,287	42,374	7,279	91,832	60.3	60,584	55,433	28,739	8,136
	12 mos.	318	1,518,536	172,943	1,828,257	442,603	229,550	70,437	496,523	90,026	1,317,113	72.0	511,144	453,782	128,485	27,114
Mobile & Ohio	Dec.	1,152	870,108	49,264	980,077	210,413	270,294	52,699	423,162	49,247	1,002,734	102.3	—22,657	—40,909	—86,971	23,749
	12 mos.	1,157	12,494,575	733,346	14,029,114	2,256,960	2,704,327	671,681	5,449,675	595,207	11,647,684	83.0	2,381,430	1,399,388	653,326	2,460,151
Monongahela	Dec.	177	429,355	3,942	435,048	43,256	69,618	1,375	127,071	10,215	251,449	57.8	183,599	166,845	77,507	146,944
	12 mos.	177	5,971,276	60,763	6,076,447	837,256	757,618	16,019	1,613,470	127,469	3,341,638	55.0	2,734,809	2,518,034	1,342,692	2,060,214
Monongahela Connecting	Dec.	6	.....	.....	77,779	13,423	20,840	300	47,162	3,186	84,911	109.2	—7,132	—11,539	—12,511	25,468
	12 mos.	6	.....	.....	1,828,931	217,440	388,952	3,627	838,107	34,296	1,482,422	81.1	346,509	256,158	192,223	502,924
Montour	Dec.	57	174,539	.....	175,407	24,284	36,336	1,231	56,943	7,612	124,579	71.0	50,828	45,504	55,229	49,292
	12 mos.	57	2,554,345	363	2,563,202	326,435	581,762	17,249	659,549	98,662	1,680,999	65.6	882,203	857,352	970,533	914,990
Nash., Chatt. & St. Louis	Dec.	1,203	1,001,348	140,927	1,295,553	186,888	256,238	68,557	548,365	76,895	1,148,332	88.6	147,221	92,673	76,880	181,753
	12 mos.	1,203	15,462,401	2,095,942	19,317,453	2,925,963	4,082,228	926,207	7,404,441	929,219	16,343,711	84.6	2,973,742	2,201,212	2,112,288	4,845,801
Nevada Northern	Dec.	165	43,716	2,424	51,620	20,583	5,612	1,177	14,068	4,766	46,206	89.5	5,414	8	1,050	40,616
	12 mos.	165	629,686	34,164	745,073	156,779	69,566	12,412	171,370	56,399	466,969	62.7	278,104	175,719	188,537	631,953
Newburgh & South Shore	Dec.	6	.....	.....	102,255	20,716	25,803	.....	45,714	8,953	101,186	99.0	1,069	—4,345	—1,526	—50,445
	12 mos.	6	.....	.....	1,372,591	178,146	202,708	.....	630,011	79,240	1,090,105	79.4	282,486	115,836	146,072	344,487
New Orleans Great Northern	Dec.	264	167,918	11,408	184,058	25,304	49,005	12,068	65,207	9,233	160,817	87.4	23,241	22,611	—2,344	—48,940
	12 mos.	267	2,530,751	158,184	2,778,287	355,300	484,849	157,083	887,039	126,504	2,008,393	72.3	769,894	602,986	254,983	355,712
New Orleans Terminal	Dec.	20	1,565	.....	163,613	8,097	10,236	.....	55,287	1,274	74,894	45.8	88,719	79,278	55,950	44,509
	12 mos.	20	26,582	.....	1,743,457	199,306	175,679	.....	651,427	19,186	1,045,598	60.0	897,859	564,574	519,119	483,029
New York Central	Dec.	11,477	21,696,757	8,749,129	35,313,587	4,867,697	8,104,034	725,714	13,731,399	1,432,556	29,375,285	83.2	5,938,302	3,949,423	2,830,300	5,534,967
	12 mos.	11,477	307,177,576	111,184,744	478,918,350	64,829,679	103,757,394	9,594,316	174,468,244	16,664,347	376,739,416	78.7	102,178,934	67,884,164	57,065,983	103,702,779
Indiana Harbor Belt	Dec.	120	.....	.....	803,301	112,847	112,404	4,847	370,255	34,442	649,053	80.8	154,248	123,095	60,996	193,968
	12 mos.	120	.....	.....	10,856,069	1,131,847	1,188,404	58,540	4,533,252	381,470	7,467,979	68.8	3,388,090	2,836,788	2,347,880	3,406,467
Pittsburgh & Lake Erie	Dec.	232	1,460,063	142,239	1,664,548	121,684	460,037	30,340	664,384	81,651	1,368,122	82.2	296,426	226,746	394,284	432,066
	12 mos.	232	24,689,908	1,780,485	27,341,198	2,893,072	7,812,470	430,726	9,319,353	952,824	21,530,952	78.8	5,810,246	4,116,422	7,373,119	7,891,540
New York, Chicago St. Louis	Dec.	1,698	2,826,018	159,808	3,115,639	225,742	624,615	119,508	1,385,375	130,423	2,488,048	79.9	627,591	389,458	113,126	278,936
	12 mos.	1,691	42,730,002	1,985,385	46,533,185	6,078,736	8,799,384	1,500,243	17,245,757	1,535,093	35,111,798	75.5	11,421,387	8,841,795	5,648,754	10,471,999
N. Y., New Haven & Hartford	Dec.	2,122	4,425,463	3,415,245	9,016,791	932,039	1,334,556	96,102	3,062,888	309,706	5,916,944	65.6	3,099,847	2,734,829	2,134,260	2,973,268
	12 mos.	2,127	62,857,804	42,274,947	118,885,515	16,587,199	18,002,612	1,201,346	38,231,104	3,749,647	79,955,347	67.3	38,930,168	32,190,312	25,084,940	33,631,144
New York Connecting	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	..	.....	.....	.....	.....

Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1930—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equip. ment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1929.
New York, Ontario & Western	Dec.	568	$527,921	$43,702	$697,767	$70,856	$144,266	$11,657	$344,108	$27,705	$601,212	86.2	$96,555	$59,589	$16,580	—$14,598
	12 mos.	568	7,281,351	1,406,959	10,417,388	1,330,502	2,058,229	193,722	4,478,946	362,851	8,464,780	81.3	1,952,608	1,462,390	883,267	851,365
Norfolk & Western	Dec.	2,236	6,419,026	303,444	7,004,330	508,851	1,146,344	126,885	1,902,859	265,267	3,958,034	56.5	3,046,296	2,295,861	2,513,503	3,541,856
	12 mos.	2,239	93,168,819	3,869,012	100,530,458	11,831,477	18,803,900	1,562,538	24,297,149	3,056,066	59,675,725	59.4	40,854,733	30,999,296	33,640,859	44,208,196
Norfolk Southern	Dec.	932	434,664	19,713	485,390	40,718	74,684	28,224	211,675	24,645	378,606	78.0	106,784	53,269	49,392	53,053
	12 mos.	932	6,260,731	271,282	6,901,455	965,548	1,024,622	345,766	2,739,982	314,268	5,371,084	77.8	1,530,371	903,704	743,010	1,291,973
Northern Pacific	Dec.	6,789	4,359,358	600,199	5,534,138	455,297	1,246,523	178,802	2,314,847	284,106	4,548,020	82.2	986,118	658,787	956,566	1,026,937
	12 mos.	6,789	65,135,270	7,727,955	80,642,412	9,884,413	17,053,769	2,750,178	28,589,123	3,131,839	62,734,420	77.8	17,907,992	10,408,818	14,293,213	21,410,344
Northwestern Pacific	Dec.	441	164,739	110,961	312,319	117,631	90,596	4,735	203,024	12,483	427,280	136.8	—114,961	—152,903	—158,491	—90,759
	12 mos.	449	3,512,924	1,555,347	5,555,533	1,236,241	1,029,217	82,570	2,533,318	202,512	5,072,599	91.3	482,934	48,801	—52,045	299,726
Oklahoma City-Ada-Atoka	Dec.	132	41,332	2,086	46,135	20,963	3,066	1,516	20,601	3,569	48,547	105.2	—2,412	—7,722	—18,192	15,431
	12 mos.	129	776,501	49,778	866,252	276,001	85,995	15,442	283,153	44,100	699,299	80.7	166,953	113,331	—39,846	—12,900
Pennsylvania R. R.	Dec.	10,878	25,983,795	8,413,208	38,643,615	3,630,046	8,469,345	799,138	16,427,209	1,625,335	31,441,500	81.4	7,202,115	5,142,059	3,688,094	5,414,945
	12 mos.	10,878	401,514,573	115,372,527	574,446,955	69,053,618	111,500,108	10,241,797	212,369,137	20,132,865	430,387,823	74 9	144,059,132	107,785,632	92,341,353	135,017,826
Long Island	Dec.	404	782,224	1,957,979	2,905,045	220,506	437,986	14,064	1,216,651	61,070	1,950,261	67.1	954,784	774,497	596,812	405,711
	12 mos.	404	10,487,667	27,070,147	39,596,434	4,496,094	5,257,354	260,137	15,302,345	785,363	26,105,925	65.9	13,490,509	10,025,730	7,995,447	8,707,943
Peoria & Pekin Union	Dec.	17	10,455	592	110,407	16,728	11,176	4,731	60,913	8,149	101,697	92.1	8,710	—16,187	28,384	33,140
	12 mos.	17	172,428	10,737	1,620,785	250,478	159,676	63,116	726,666	95,494	1,295,430	79.9	325,355	112,598	424,622	499,145
Pere Marquette	Dec.	2,291	1,926,279	158,848	2,244,100	419,703	490,030	73,309	1,012,848	108,537	2,100,875	93.6	143,225	—24,443	—125,238	—129,167
	12 mos.	2,255	32,779,262	2,183,602	37,216,377	5,369,883	7,602,894	903,465	13,783,063	1,358,962	29,030,270	78.0	8,186,107	6,232,583	4,541,164	9,273,417
Pittsburgh & Shawmut	Dec.	102	93,187	2,936	96,657	12,929	25,428	1,426	27,030	6,745	73,558	76.1	23,099	22,549	21,984	28,224
	12 mos.	102	1,113,497	41,057	1,176,421	156,212	267,175	19,660	346,836	90,006	879,889	74.8	296,532	284,471	305,737	356,865
Pittsburgh & West Virginia	Dec.	92	173,790	2,688	203,843	25,610	63,300	16,791	51,980	23,006	189,079	92.8	14,764	39,705	74,740	94,105
	12 mos.	92	3,423,494	34,645	3,787,880	342,833	878,514	227,383	723,981	259,633	2,547,663	67.3	1,240,217	952,047	1,555,311	2,276,784
Pittsburgh, Shawmut & Northern	Dec.	198	114,632	599	118,730	14,852	43,618	1,487	41,022	7,199	108,178	91.1	10,552	10,491	5,930	—239,509
	12 mos.	198	1,517,210	9,551	1,569,868	335,840	332,025	20,396	533,804	82,817	1,304,882	83.1	264,986	233,785	153,536	12,246
Quincy, Omaha & Kansas City	Dec.	249	40,602	4,692	51,842	28,511	8,123	974	22,359	2,335	62,216	120.0	—10,374	—16,040	—18,314	—35,038
	12 mos.	249	630,661	64,112	768,345	310,310	88,115	10,680	305,183	30,001	741,562	96.5	26,783	—30,490	—62,076	—135,471
Reading	Dec.	1,449	5,927,352	486,028	6,891,359	916,196	1,608,670	94,070	2,789,583	239,138	5,672,534	82.3	1,218,825	1,393,940	1,391,612	1,368,073
	12 mos.	1,458	75,176,681	5,950,185	86,922,614	13,253,104	21,111,063	1,141,384	33,674,255	2,697,663	72,160,861	83.0	14,761,753	12,464,082	12,644,507	17,196,521
Atlantic City	Dec.	163	106,219	51,678	171,906	43,169	24,493	3,510	133,526	8,606	213,855	124.4	—41,949	—82,360	—90,836	—66,752
	12 mos.	163	1,301,733	1,515,895	3,046,203	802,570	267,499	47,449	2,003,414	63,141	3,185,960	104.6	—139,757	—633,684	—845,601	—130,242
Richmond, Fredericksburg & Potomac	Dec.	117	390,354	258,963	881,429	58,848	149,372	11,118	300,168	34,119	566,520	64.3	314,909	246,578	187,798	299,365
	12 mos.	117	5,173,679	3,161,889	10,343,439	1,346,879	1,995,634	125,410	3,699,221	460,711	7,876,347	76.1	2,467,092	1,920,384	1,307,836	2,434,944
Rutland	Dec.	413	207,095	59,858	373,153	58,538	82,086	10,707	169,067	16,133	335,759	90.0	37,394	17,887	30,399	33,132
	12 mos.	413	3,132,730	884,611	5,286,186	952,734	1,045,559	136,185	2,132,326	200,951	4,484,491	84.8	801,695	526,952	606,140	997,011
St. Louis-San Francisco	Dec.	5,264	3,555,693	605,506	4,654,769	568,056	493,498	120,911	1,861,324	210,084	3,276,720	70.4	1,378,049	1,136,153	1,123,012	1,204,555
	12 mos.	5,268	56,768,979	8,169,977	70,956,462	8,903,794	12,387,523	1,529,003	24,661,296	2,676,106	50,125,350	70.6	20,831,112	16,616,477	16,702,186	20,740,161
Ft. Worth & Rio Grande	Dec.	233	46,714	3,669	58,225	24,242	11,462	2,654	34,936	3,376	76,664	131.7	—18,439	—22,104	—29,700	—31,101
	12 mos.	233	671,064	50,432	815,446	260,096	162,923	35,384	456,746	48,606	956,703	117.3	—141,257	—194,190	—294,654	—181,085
St. Louis, San Francisco & Texas	Dec.	262	116,235	7,085	128,894	20,779	12,980	6,524	53,606	8,847	102,689	79.7	26,205	18,869	—11,735	4,388
	12 mos.	208	1,697,283	109,084	1,893,420	317,326	266,829	75,345	699,668	176,510	1,531,117	80.9	362,303	309,898	—41,734	83,241
St. Louis Southwestern Lines	Dec.	1,913	1,254,335	59,561	1,431,922	192,241	243,919	114,580	607,272	83,869	1,184,092	82.7	247,830	168,464	59,472	121,669
	12 mos.	1,843	19,406,275	865,141	21,881,362	3,351,655	3,426,364	1,318,815	7,693,938	1,103,783	16,944,380	77.4	4,936,982	3,862,387	2,219,328	3,528,363
San Diego & Arizona	Dec.	155	39,233	13,479	57,175	12,741	16,435	3,402	20,601	6,334	60,642	106.1	—3,467	—9,074	—6,633	9,494
	12 mos.	155	797,067	186,546	1,017,784	185,854	196,782	43,725	289,957	91,941	823,261	80.9	194,523	128,593	143,444	265,050
Seaboard Air Line	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
Southern Ry.	Dec.	6,731	6,847,849	1,384,230	9,092,116	981,201	1,612,862	155,431	3,253,207	362,905	6,426,428	70.7	2,665,688	2,114,740	2,007,984	2,073,072
	12 mos.	6,731	91,799,046	17,129,081	118,868,608	17,089,087	22,283,262	2,708,341	41,880,049	4,321,299	89,162,916	75.0	29,705,692	21,310,353	19,708,163	30,030,977
Alabama Great Southern	Dec.	314	428,452	86,474	565,832	Cr. 72,756	27,358	7,896	190,767	22,720	181,294	32.0	384,538	309,223	318,409	207,507
	12 mos.	314	6,191,961	1,155,861	7,934,231	1,274,113	1,707,330	219,987	2,599,654	285,082	6,158,724	77.6	1,775,507	1,147,697	1,327,268	2,468,709
Cin., New Orleans & Tex. Pac.	Dec.	338	1,045,814	169,225	1,301,579	18,775	319,262	15,736	380,845	53,570	792,269	60.9	509,310	452,752	458,687	405,289
	12 mos.	338	14,960,439	2,062,915	18,041,950	2,742,279	4,098,228	456,257	5,345,747	637,473	13,384,156	74.2	4,657,794	3,613,939	3,620,613	3,995,695
Georgia Southern & Florida	Dec.	397	161,657	61,525	253,551	18,361	61,529	1,830	113,267	292	199,157	78.5	54,394	28,841	35,145	26,717
	12 mos.	397	2,491,935	781,733	3,563,710	668,628	786,197	24,823	1,334,530	31,361	2,903,705	81.5	660,005	376,134	373,567	427,624
New Orleans & Northeastern	Dec.	204	276,528	43,411	349,132	27,019	69,968	4,425	114,875	13,432	232,936	66.7	116,196	99,828	78,742	57,027
	12 mos.	204	3,438,522	566,178	4,302,357	659,526	850,534	124,386	1,402,085	170,572	3,248,594	75.5	1,053,763	573,603	274,575	881,245

Continued on Second Left Hand Page Following

In the last 2 years

519 LOCOMOTIVES

have incorporated, wholly or in part, the

LIMA A-1 Principles

■ In the last two years, over 31% of all locomotives ordered followed wholly or in part the principles first developed in the A-1, the pioneer Super-Power Locomotive built by Lima.

■ What this has meant in operating economies is shown by one road where 35 Super-Power Locomotives are in service on one division.

■ These locomotives replaced a greater number of Mikado and Santa Fe types, none of which was over 10 years old and most of which were only 5 years old.

■ A study of operating data on that division, covering a period of several months showed that the Super-Power Locomotives produced 1000 Gross Ton Miles for a cost of 33.25c as compared with a cost of 50.45c for the older locomotives. This is a saving of 34%.

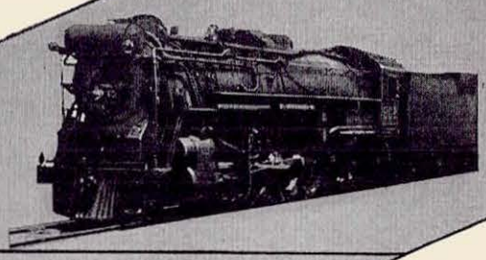
LIMA
LOCOMOTIVE WORKS
INCORPORATED

LIMA LOCOMOTIVE WORKS
INCORPORATED
LIMA - - - - - - OHIO

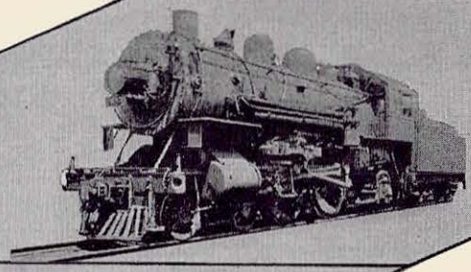
ALL BRANCHES of RAILROAD SERVICE

Recognize the *Earning Power* of the **BOOSTER**...

OVER 4000 NOW IN USE ON EIGHTY-TWO WELL KNOWN

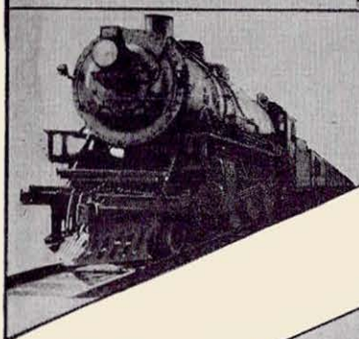


The concentrated power of the Booster when put to work on grades keeps high speed scheduled freights on time.

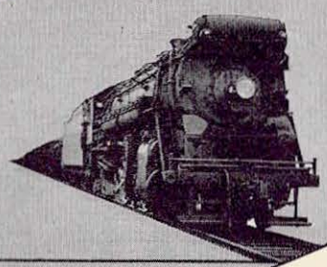


The first Booster was applied to an Atlantic Type Locomotive. Many are still operated due to the extra power the Booster provides.

In the warm climate and hills and valleys of Mexico, the railroads recognize the value of Booster power.



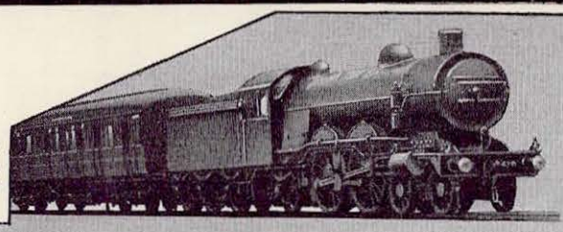
On Mountain Type Locomotives in transcontinental service, the Booster starts trains easily and increases the average speed.



In moving heavy commodities such as coal, Booster power starts heavier drags, brings them to road speed quicker and retains speed on grades.

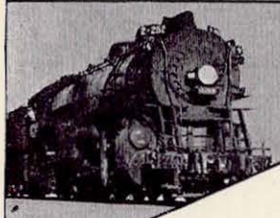
For switching, hump and similar service, Booster-equipped engines speed up work and increase yard capacity.

RAILROADS

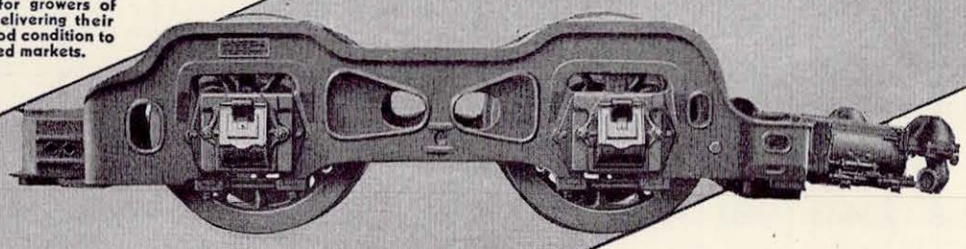


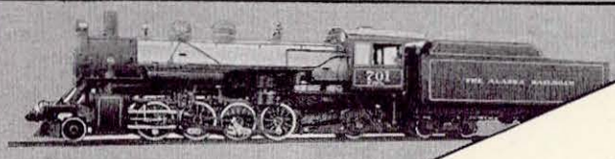
The Booster is taking the "jerk" out of passenger service in England, as well as in other foreign countries.

Operators of open pit mines, where railroad conditions are unusually severe, have found the Booster a capable aid in meeting all emergencies.



The Booster is a valuable aid in maintaining dependable transportation for growers of perishables delivering their products in good condition to widely separated markets.





In cold, mountainous Alaska, the added power of the Booster prevents delays and increases tonnage hauled.

WHEN the two- and four-wheel trailing truck removed old limits of design and made possible the use of larger boilers, it was The Locomotive Booster which restored the balance that greater boiler power would otherwise have disturbed.

The Booster today has become a fundamental element in locomotive design. Its earning capacity has been established in all branches of railroad service during a period of more than ten years.

How thoroughly The Locomotive Booster has been accepted is best told by the fact that over 4000 are now in use on 82 well known railroads. Throughout North America . . . in Australia, Africa, England, South America . . . in fact, all over the world, the value of the Booster is recognized.

Because it soon pays for itself, the Booster should be included on every modern locomotive. It also brings the old ones into new usefulness and profitable operation.

FRANKLIN RAILWAY SUPPLY CO., INC.

NEW YORK CHICAGO SAN FRANCISCO ST. LOUIS MONTREAL

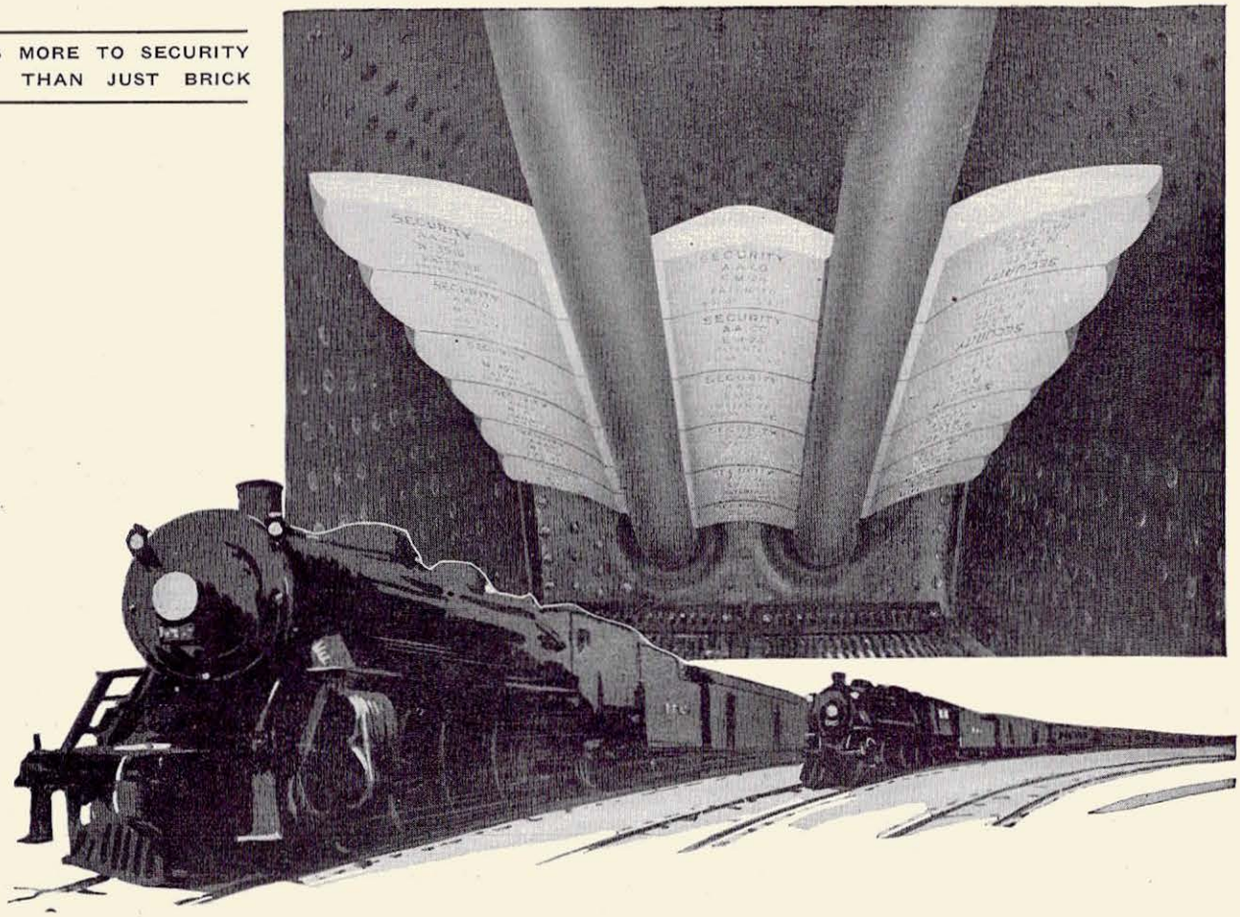
Revenues and Expenses of Railways

MONTH OF DECEMBER AND TWELVE MONTHS OF CALENDAR YEAR 1930—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equip. ment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1929.
Northern Alabama	Dec.	110	$67,111	$3,166	$72,846	$11,656	$2,944	$1,155	$25,129	$2,977	$43,861	60.2	$28,985	$23,469	$20,289	$30,303
	12 mos.	110	924,891	39,482	996,924	222,658	39,480	23,120	336,179	36,410	657,810	66.0	339,114	274,021	69,769	213,269
Southern Pacific	Dec.	9,125	8,956,140	2,701,482	13,016,735	1,521,498	2,150,867	402,672	4,718,924	611,524	9,714,644	74.6	3,302,091	2,287,602	1,892,163	2,862,392
	12 mos.	9,125	138,010,278	34,291,656	188,837,681	22,994,238	31,251,669	4,836,463	62,857,075	7,759,816	132,831,268	70.3	56,006,413	40,638,257	35,139,394	48,658,978
So. Pacific Steamship Lines	Dec.	....	397,361	23,365	459,109	17,795	112,660	21,586	395,818	31,863	579,722	126.3	—120,613	—127,020	—127,152	—254,351
	12 mos.	....	6,712,090	595,081	7,815,536	231,550	1,766,189	257,367	5,569,523	455,476	8,280,105	105.9	—464,569	—485,924	—465,724	—471,247
Texas & New Orleans	Dec.	4,700	3,411,532	601,998	4,466,506	714,041	794,361	150,844	1,461,402	240,021	3,384,662	75.8	1,081,844	814,306	581,089	475,136
	12 mos.	4,710	48,858,741	8,231,023	62,104,912	9,529,262	11,395,377	2,066,864	20,361,694	3,061,358	46,533,489	74.9	15,571,423	11,637,206	8,425,476	11,696,691
Spokane, Portland & Seattle	Dec.	554	388,787	58,609	493,523	125,334	94,426	12,050	204,651	23,603	462,781	93.8	30,742	—41,391	—72,913	37,911
	12 mos.	554	6,302,132	860,445	7,836,349	1,261,988	1,170,786	152,957	2,560,119	280,148	5,490,031	70.1	2,346,318	1,318,637	1,131,176	2,236,906
Tennessee Central	Dec.	295	197,666	8,430	218,215	30,345	26,987	8,966	74,552	12,161	152,856	70.0	65,359	58,935	43,373	6,414
	12 mos.	295	2,782,058	122,134	3,064,838	546,294	468,326	110,668	1,081,941	165,676	2,366,757	77.2	698,081	615,549	408,560	495,773
Terminal R. R. Assn. of St. Louis	Dec.	55	.....	.....	660,884	85,922	77,198	3,385	339,661	25,091	534,313	80.8	126,571	62,426	152,653	55,057
	12 mos.	55	.....	.....	10,140,836	1,526,109	965,586	37,693	4,755,583	311,619	7,634,499	75.3	2,506,337	1,225,975	2,286,148	3,363,026
Texas & Pacific	Dec.	1,955	2,189,207	332,893	2,830,654	494,728	489,471	82,075	947,788	117,322	2,087,326	73.7	743,328	812,354	707,628	455,984
	12 mos.	1,955	30,286,655	4,415,831	37,542,301	5,638,322	6,226,466	1,051,306	12,005,451	1,505,670	26,421,279	70.4	11,121,022	9,374,923	7,235,687	8,778,383
Texas Mexican	Dec.	162	85,977	2,167	78,591	18,005	16,772	3,689	20,591	7,947	65,181	82.9	13,410	7,197	7,477	4,749
	12 mos.	162	977,293	37,430	1,110,983	178,457	188,115	40,948	449,729	96,424	937,752	84.4	173,231	111,674	35,283	106,768
Toledo, Peoria & Western	Dec.	239	120,548	72	124,870	17,977	24,012	14,620	47,012	13,717	117,338	94.0	7,532	8,399	—95	—56,742
	12 mos.	239	1,942,902	2,661	1,992,631	226,225	263,905	172,404	731,013	115,107	1,508,636	75.7	483,995	408,916	291,345	359,413
Toledo Terminal	Dec.	28	.....	.....	95,299	13,688	12,962	583	43,534	8,663	79,430	83.4	15,869	3,523	29,943	28,808
	12 mos.	28	.....	.....	1,170,671	158,217	185,547	6,924	540,428	63,574	954,044	81.5	216,627	61,428	312,156	585,023
Ulster & Delaware	Dec.	128	22,179	1,949	59,644	14,611	11,617	1,247	34,074	3,862	65,411	109.7	—5,767	—11,776	—12,991	—9,897
	12 mos.	128	386,386	156,137	976,641	168,101	160,700	16,799	494,561	47,097	887,258	90.8	89,383	21,474	—9,064	32,346
Union R. R. of Penna	Dec.	45	.....	.....	396,205	183,559	148,084	217	236,681	14,499	603,040	152.2	—206,835	—196,934	—150,541	67,821
	12 mos.	45	.....	.....	8,844,037	1,307,620	1,994,220	1,996	3,793,666	177,928	7,271,513	82.2	1,572,524	1,380,993	2,118,600	3,954,668
Union Pacific	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
Oregon Short Line	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
Oregon-Wash. R. R. & Nav. Co.	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
Los Angeles & Salt Lake	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
St. Joseph & Grand Island	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
Utah	Dec.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
	12 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....
Virginian	Dec.	561	1,330,065	19,103	1,436,421	101,033	199,769	13,877	280,643	29,992	625,906	43.6	810,515	610,485	716,402	786,402
	12 mos.	554	16,210,622	246,277	17,455,269	1,749,499	3,029,327	174,196	3,603,795	387,713	8,940,504	51.2	8,514,765	6,507,713	7,415,869	8,792,097
Wabash	Dec.	2,523	3,968,775	418,947	4,701,622	362,374	688,565	190,707	1,798,560	116,519	3,179,448	67.6	1,522,174	1,264,785	892,318	735,392
	12 mos.	2,523	52,247,176	5,359,000	61,970,752	7,621,983	10,317,394	2,272,975	24,311,522	2,470,258	47,249,762	76.2	14,720,990	12,080,198	7,711,675	13,251,596
Ann Arbor	Dec.	293	322,631	7,989	340,999	22,279	55,739	13,581	167,743	17,192	275,527	80.8	65,472	53,032	26,662	78,692
	12 mos.	293	4,696,913	135,180	5,025,808	475,966	940,924	171,560	2,095,440	186,320	3,865,006	76.9	1,160,802	859,075	533,514	1,042,452
Western Maryland	Dec.	986	1,320,438	12,230	1,372,810	175,171	263,957	41,551	375,776	68,601	932,188	67.9	440,622	396,412	402,992	449,029
	12 mos.	895	16,599,264	171,606	17,792,694	2,580,968	3,303,822	521,677	4,656,479	562,186	11,638,562	65.4	6,154,132	5,139,922	5,253,239	5,819,526
Western Pacific	Dec.	1,051	883,970	48,443	1,006,038	146,362	218,849	62,771	477,101	55,823	984,510	97.9	21,528	—46,633	—30,365	48,191
	12 mos.	1,051	13,796,557	1,081,138	16,298,581	2,609,863	2,641,269	822,628	5,953,314	592,267	13,152,839	80.7	3,145,742	2,032,004	1,910,761	2,501,516
Wheeling & Lake Erie	Dec.	511	809,739	16,429	884,815	83,288	386,492	36,628	320,693	51,788	879,848	99.4	4,967	—29,223	—29,340	159,506
	12 mos.	511	15,090,067	187,001	16,358,984	1,875,038	4,213,092	444,387	4,899,685	536,306	11,977,414	73.2	4,381,570	2,929,713	3,052,945	5,115,433
Wichita Falls & Southern	Dec.	203	135,115	942	138,879	7,561	8,326	2,432	19,058	3,382	38,871	27.99	100,008	113,297	108,867	84,346
	12 mos.	203	929,847	4,991	983,013	171,630	118,261	34,045	287,056	50,896	647,939	65.91	335,074	290,672	224,661	324,139

News Department Continued on Next Left Hand Page

THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK



AN ENGINE IS AILING . . .
out goes the Arch Man

WHEN AN ENGINE fails to steam properly, when combustion is causing trouble, wise old railroaders call the American Arch service man.

His is a ripe experience, enriched by years of observing and correcting combustion troubles. Sometimes the locomotive Arch may need changing because conditions of firing have altered. But more often than not, there is some other obscure trouble that the American Arch Company expert quickly recognizes because in his years of dealing with locomotive combustion he has run across it before.

Such service is only one of the many ways in which American Arch Company insures getting the best possible service from Arch Brick.

Harbison-Walker Refractories Co.
Refractory Specialists

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NEWS

(Continued from page 339)

meet similar reductions proposed by the Frisco. The Denver & Rio Grande Western has established a two-cents-a-mile rate on its line between Grand Junction, Colo., and Montrose.

After the Interstate Commerce Commission failed to suspend the two-cent rate proposed by the Frisco as requested by several other southwestern carriers, various railroads in the territory of the Frisco announced the two-cent rate between competitive points, effective February 1. These include, the Missouri Pacific, the Missouri-Kansas-Texas, the St. Louis Southwestern, the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe, the Kansas City Southern and the Illinois Central.

Railways Minister in Tribute to Thornton

"In 1936 Canada will celebrate the centenary of the building of the first railroad in this Dominion, and that first railroad, between Laprairie and St. Johns is now part of the Canadian National. What finer ambition could there be, for Sir Henry Thornton to have, and for you officers of the Canadian National to have, than that in five years from now you could put the system in an independent financial position, free of the need of assistance from the Dominion of Canada. That is a goal for all of you to work towards, co-operating with Sir Henry Thornton. I hope that Sir Henry can bring that about. Then he, and you who are co-operating with him so wholeheartedly, will have done a service for the Dominion of Canada which its people can never repay."

In these words Hon. Robert J. Manion, Minister of Railways and Canals in the Dominion government, last week placed an objective before the officers of the Canadian National on the occasion of a dinner tendered in Montreal to the members of the new board of directors and representatives of co-operative committees and organized labor, on the occasion of the first meeting of the new board of directors.

Dr. Manion was responding to a toast to himself proposed by Tom Moore, president of the Canadian Trades and Labor Congress and Labor's representative on the board of directors of the railway. The audience he addressed was composed of officers of the system, representing various departments, gathered in Montreal for the purpose of holding their annual meetings for discussion of traffic, operating and other matters concerning the railroad system; the members of the new board of directors, attending their first meeting since their appointment; members of the co-operative committees representing shop crafts, maintenance of way and bridge and building employees with whom the railway system has joint management agreements, and general chairmen of the various railroad crafts who were meeting in Montreal. These were the guests of Canadian National officers at the gathering, at which the Minister of Railways and Canals was the guest of honor.

"Sir Henry Thornton," continued Dr. Manion, "has been associated with the Canadian National since 1922. In the last six months I have learned a great deal about the secret of the esprit de corps which he has encouraged on the railways. He has been able to develop this esprit de corps and efficiency because he is not only likable but because he is also efficient. Whether or not we always agree with what he says, we have to respect and to like him. When we consider the beginnings which he had, the lines and the staffs, we must admit that he has brought about a magnificent accomplishment in the Dominion of Canada."

Sir Henry responded to the tribute with praise for Dr. Manion, calling attention to his friendly attitude toward the railway.

B. M. Jewell, president of the Railway Employees Department of the Federation of Labor and representative of shop, track, bridge and building workers, in addressing the gathering, said: "We of the shop, track, bridge and building workers, propose to carry on and give our every effort to the idea of co-operation with Sir Henry Thornton. We stand solidly behind him and all we ask is that he be spared to us for many years to come," Mr. Jewell continued.

"The Canadian National co-operative plan is lifting men and management to a higher plane," said Prof. S. H. Slichter of Harvard University, who is in Canada making a study of co-operative economics. The co-operative movement, Prof. Slichter declared, as a result of his studies in Canada and the United States, tends to encourage men to do things and "counteracts the passive resistance of the individual."

Mexican Unions Support Rail Plan Conditionally

The Confederation of Transportation and Communications, controlling a majority of the railway employee unions in Mexico, following the announcement of President Ortiz Rubio of the government's full support of the plan for the reorganization of the National Railways of Mexico, has issued a statement accepting in general the recommendations affecting the personnel of the Railways, which involve the dismissal of about 13,000 men.

The Confederation during 1930 accepted a readjustment of the forces in the maintenance of way department which has resulted in the employment of 2,500 less men. With the management of the National Railways and the Mexican Department of Labor the unions are now studying the readjustment of working days in the mechanical department, which it is expected will effect an annual saving of about $2,000,000. The Confederation proposes that the working days per week be reduced from six to five and avers that the company will make greater savings by that method than by dismissal of employees.

The Confederation particularly opposes a reduction of forces among the office workers and is not willing that the management be given complete liberty to employ men without consulting the unions, alleging that such a system would destroy the seniority lists. The unions also charge that the excess of personnel is not as great as claimed by the management, and that the excess is proportionately greater among the supervisory officers of the railroad.

Meetings & Conventions

The following list gives names of secretaries, date of next or regular meetings and places of meetings.

AIR BRAKE ASSOCIATION.—T. L. Burton, Room 5605, Grand Central Terminal Building, New York City. Next meeting, May 19-22, 1931, Royal York Hotel, Toronto, Ont. Exhibit by Air Brake Appliance Association.

AIR BRAKE APPLIANCE ASSOCIATION.—Fred W. Venton, Crane Company, 836 So. Michigan Blvd., Chicago. Meets with Air Brake Association.

AMERICAN ASSOCIATION OF FREIGHT TRAFFIC OFFICERS.—W. R. Curtis, F. T. R., M & O. R. R., Chicago, Ill.

AMERICAN ASSOCIATION OF GENERAL BAGGAGE AGENTS.—E. L. Duncan, 332 S. Michigan Ave., Chicago. Next convention, June 16-18, 1931, West Baden Springs Hotel, West Baden, Ind.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J. 143 Liberty St., New York.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—A. G. Peck, Acting Secretary, 811 W. 35th Street, Kansas City, Mo. Next meeting June 9-13, 1931, Jefferson Hotel, St. Louis, Mo.

AMERICAN ASSOCIATION OF SUPERINTENDENTS OF DINING CARS.—F. R. Borger, C. I. & L. R. R., 836 Federal St., Chicago. Next convention, October 20-22, 1931, Baltimore, Md.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—Guy C. Hecker, 292 Madison Ave., New York. Next convention, September 26-October 2, 1931. Atlantic City, N. J.

AMERICAN RAILWAY ASSOCIATION.—H. J. Forster, 30 Vesey St., New York, N. Y.

Division I.—Operating.—J. C. Caviston, 30 Vesey St., New York, N. Y.

Freight Station Section. — R. O. Wells, Freight Agent, Illinois Central Railroad, Chicago.

Medical and Surgical Section.—J. C. Caviston, 30 Vesey St., New York. Next convention June 8-9, 1931, Pennsylvania Hotel, New York, N. Y.

Protective Section.—J. C. Caviston, 30 Vesey St., New York. Next convention June 23-25, 1931, Stevens Hotel, Chicago, Ill.

Safety Section.—J. C. Caviston, 30 Vesey St., New York.

Telegraph and Telephone Section.—W. A. Fairbanks, 30 Vesey St., New York

Division II.—Transportation.—G. W. Covert, 59 East Van Buren St., Chicago.

Division III.—Traffic.—J. Gottschalk, 143 Liberty St., New York.

Division IV—Engineering.—E. H. Fritch, 59 East Van Buren St., Chicago. Next meeting, March 10-11, 1931, Palmer House, Chicago. Exhibit by National Railway Appliances Association.

Construction and Maintenance Section.—E. H. Fritch. Next meeting, March 10-11, 1931, Palmer House, Chicago.

Electrical Section—E. H. Fritch.

Signal Section.—R. H. C. Balliet, 30 Vesey St., New York. Annual meeting May 12-13, 1931, New York City.

Division V.—Mechanical.—V. R. Hawthorne, 59 East Van Buren St., Chicago. Next meeting, June 23-25, 1931, Congress Hotel, Chicago.

Equipment Painting Section.—V. R. Hawthorne, 59 East Van Buren St., Chicago.

Division VI.—Purchases and Stores.— W. J. Farrell, 30 Vesey St., New York, N. Y.

Division VII.—Freight Claims.—Lewis Pilcher, 59 East Van Buren St., Chicago.

Division VIII.—Motor Transport.—George M. Campbell, 30 Vesey St., New York, N. Y.

Car Service Division.—C. A. Buch, 17th and H. Sts., N. W., Washington, D. C.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W. Ry., 319 N. Waller Ave., Chicago. Next convention, October 20-22, 1931, Toronto, Ont. Exhibit by Bridge and Building Supply Men's Association.

AMERICAN RAILWAY DEVELOPMENT ASSOCIATION.—A. W. Large, Gen. Agri. Agt., C. R. I. & P. Ry., Chicago, Ill. Annual meeting, June 17-19, 1931, Hotel Benjamin Franklin, Philadelphia, Pa.

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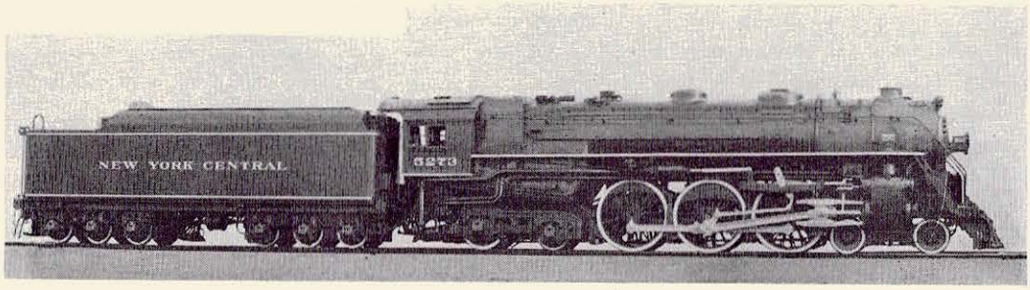
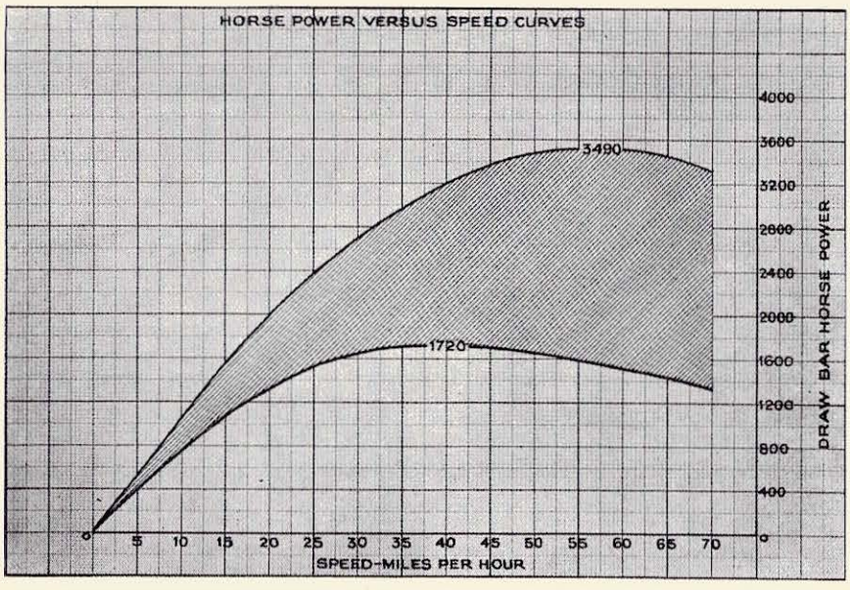
Alco Built



Weight on Drivers, 188,500 pounds; Weight of Engine, 351,000 pounds; Cylinders, 25 x 28 inches; Diameter of Drivers, 79 inches; Boiler Pressure, 225 pounds; Maximum Tractive Power with Booster, 53,200 pounds.



Curve shows horse-power versus speed for the modern Hudson Type as compared with the K-3 Pacific, the main passenger engine of six years ago on the New York Central Lines.

The Hudson type has approximately the same weight on drivers. The large increase in horse-power capacity, as represented by the cross-sectional area, indicates the possibilities available in modern power where weights are limited and higher track stresses are not permissible.

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AMERICAN RAILWAY ENGINEERING ASSOCIATION.—Works in co-operation with the American Railway Association, Division IV.—E. H. Fritch, 59 East Van Buren St., Chicago. Next meeting, March 10-11, 1931, Palmer House, Chicago. Exhibit by National Railway Appliances Association.

AMERICAN RAILWAY MAGAZINE EDITORS ASSOCIATION.—Miss E. Phillips, N. Y., N. H. & H. Magazine, Boston, Mass. Next meeting, June 4, 1931, Philadelphia, Pa.; June 5, 1931, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, C., M., St. P. & P. R. R., 11402 Calumet Ave., Chicago. Exhibit by Supply Association of the American Railway Tool Foremen's Association.—E. E. Caswell, Union Twist Drill Co., 11 S. Clinton St., Chicago.

AMERICAN SHORT LINE RAILROAD ASSOCIATION.—R. E. Schindler, Secretary, Union Trust Bldg., Washington, D. C.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Railroad Division, Paul D. Mallay, Johns-Manville Corp., 292 Madison Ave., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—H. L. Dawson, 1104 Chandler Building, Washington, D. C.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—H. D. Morris, District Claim Agent, Northern Pacific Ry., St. Paul, Minn. Annual convention, June 17-19, 1931, Royal York Hotel, Toronto, Ont.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Station, Chicago. Exhibit by Railway Electrical Supply Manufacturers' Association.

ASSOCIATION OF RAILWAY EXECUTIVES.—Stanley J. Strong, Transportation Building, Washington, D. C.

ASSOCIATION OF RAILWAY SUPPLY MEN.—J. F. Gettrust, Ashton Valve Company, 565 Washington Blvd., Chicago. Meets with International Railway General Foremen's Association.

BOILERMAKERS' SUPPLY MEN'S ASSOCIATION.—Frank C. Hasse, Oxweld R. R. Service Company, 230 N. Michigan Ave., Chicago. Meets with Master Boiler Makers' Association.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—S. A. Baber, High Grade Manufacturing Co., 10418 St. Clair Ave., Cleveland, Ohio. Meets with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—C. R. Crook, 2276 Wilson Ave., N. D. G., Montreal, Que. Regular meetings, 2nd Monday in each month, except June, July and August, Windsor Hotel, Montreal, Que.

CAR DEPARTMENT OFFICERS' ASSOCIATION.—A. S. Sternberg, M. C. B. Belt Ry. of Chicago, 7926 South Morgan Street, Chicago. Exhibit by Supply Men's Association.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—G. K. Oliver, Chicago & Alton, 3001 W. 39th Place, Chicago. Regular meetings, 2nd Monday in month, except June, July and August, Great Northern Hotel, Chicago.

CAR FOREMEN'S ASSOCIATION OF LOS ANGELES.—J. W. Krause, Room 299, 610 So. Main St., Los Angeles, Cal. Regular meetings, second Monday of each month, except July, August and September, Room 299, 610 So. Main St., Los Angeles.

CAR FOREMEN'S ASSOCIATION OF ST. LOUIS, MO.—F G. Wiegman, 720 N. 23rd St., East St. Louis, Ill. Meetings first Tuesday of each month, except July and August, American Hotel Annex, 6th and Market Sts., St. Louis, Mo.

CENTRAL RAILWAY CLUB OF BUFFALO.—T. J. O'Donnell, 1004 Prudential Building, Buffalo, N. Y. Regular meetings, 2nd Thursday each month, except June, July, August, Hotel Statler, Buffalo, N. Y.

CINCINNATI RAILWAY CLUB.—D. R. Boyd, 453 E. 6th St., Cincinnati, Ohio. Meetings 2nd Tuesday in February, May, September and November.

CLEVELAND RAILWAY CLUB.—F. L. Frericks, 14416 Alder Ave., Cleveland, Ohio. Meetings, second Monday each month, except July, August, September, Auditorium, Brotherhood of Railroad Trainmen's Building, West 9th St., and Superior Ave., Cleveland.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—W. J. Mayer, Michigan Central R. R., Detroit, Mich. Exhibit of International Railroad Master Blacksmiths' Supply Men's Association.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' SUPPLY MEN'S ASSOCIATION.—J. H. Jones, Crucible Steel Company of America, 650 Washington Blvd., Chicago. Meets with International Railroad Master Blacksmiths' Association.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. T. Winkless, Room 700 La Salle Street Station, Chicago. Exhibit by International Railway Supply Men's Association.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1061 W. Wabasha St., Winona, Minn.

INTERNATIONAL RAILWAY SUPPLY MEN'S ASSOCIATION.—C. M. Huffman, Dearborn Chemical Co., 310 So. Michigan Ave., Chicago. Meets with International Railway Fuel Association.

MASTER BOILER MAKERS ASSOCIATION—A. F. Stiglmeier, 29 Parkwood St., Albany, N. Y. Exhibit by Boiler Makers' Supply Men's Association.

MASTER CAR BUILDERS' AND SUPERVISORS' ASSOCIATION.—(See Car Department Officers' Association.)

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS.—James B. Walker, 270 Madison Ave., New York. Annual convention, 1931, Richmond, Va.

NATIONAL ASSOCIATION OF RAILROAD TIE PRODUCERS.—Roy. M. Edmonds, 1252 Syndicate Trust Bldg., St. Louis, Mo. Annual convention, May 5-7, 1931, West Baden Springs Hotel, West Baden, Ind.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, 1014 South Michigan Ave., Chicago. Exhibit at A. R. E. A. convention.

NATIONAL SAFETY COUNCIL.—Steam Railroad Section: J. L. Walsh, Supt. Safety, M.-K.-T. R. R., Dallas, Tex. Annual congress, October 12-16, 1931, Hotel Stevens, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2nd Tuesday in month, excepting June, July, August and September, Copley Plaza Hotel, Boston, Mass.

NEW YORK RAILROAD CLUB.—D. I. McKay, 26 Cortlandt St., New York. Regular meetings, 3rd Friday in month, except June, July and August, 29 W. 39th St., New York City.

PACIFIC RAILWAY CLUB.—W. S. Wollner, P. O. Box 3275, San Francisco, Cal. Regular meetings 2nd Thursday in month, alternately in San Francisco and Oakland.

RAILWAY ACCOUNTING OFFICERS' ASSOCIATION.—E. R. Woodson, 1124 Woodward Building, Washington, D. C.

RAILWAY BUSINESS ASSOCIATION.—Frank W Noxon, 1112 Shoreham Building, Washington, D. C.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 1841 Oliver Building, Pittsburgh, Pa. Regular meeting, 4th Thursday in each month, except June, July and August, Fort Pitt Hotel, Pittsburgh, Pa.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—Edward Wray, 9 S. Clinton St., Chicago. Meets with Association of Railway Electrical Engineers.

RAILWAY EQUIPMENT MANUFACTURERS' ASSOCIATION.—F. W. Venton, Crane Co., 836 S. Michigan Ave., Chicago. Meets with Traveling Engineers' Association.

RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio R. R., Baltimore, Md.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver Bldg., Pittsburgh, Pa. Meets with Mechanical Division, Purchases and Stores Division and Motor Transport Division, American Railway Association.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 30 Church St., New York. Meets with Telegraph and Telephone Section of A. R. A. Division 1.

RAILWAY TREASURY OFFICERS' ASSOCIATION.—L. W. Cox, 1217 Commercial Trust Bldg., Philadelphia, Pa.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—T. F. Donahoe, Gen. Supvr. Road, Baltimore & Ohio, Pittsburgh, Pa. Next convention, September 22-24, 1931, Hotel Stevens, Chicago. Exhibit by Track Supply Association.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Drawer 24, M. P. O., St. Louis, Mo. Regular meetings, 2nd Friday in month, except June, July and August.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, West Nyack (Rockland Co.), N. Y. Meets with A. R. A. Signal Section.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205, Atlanta, Ga. Regular meetings, 3rd Thursday in January, March, May, July, September and November. Ansley Hotel, Atlanta.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—R. G. Parks, A. B. & C. Ry., Atlanta, Ga.

SUPPLY MEN'S ASSOCIATION.—E. H. Hancock, Treasurer, Louisville Varnish Co., Louisville, Ky. Meets with A. R. A. Div. V. Equipment Painting Section.

SUPPLY MEN'S ASSOCIATION.—Bradley S. Johnson, W. H. Miner, Inc., 667 The Rookery Building, Chicago. Meets with Car Department Officers' Association.

TRACK SUPPLY ASSOCIATION.—L. C. Ryan, Oxweld Railroad Service Co., Carbon & Carbide Building, Chicago. Meets with Roadmasters' and Maintenance of Way Association.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, 1177 East 98th St., Cleveland, O. Next convention March 25-28, 1931, Hotel Sherman, Chicago. Exhibit by Railway Equipment Manufacturers' Association.

WESTERN RAILWAY CLUB.—W. J. Dickinson, 343 So. Dearborn St., Chicago. Regular meetings 3rd Monday each month, except June, July and August.

Equipment and Supplies

FREIGHT CARS

THE INLAND STEEL COMPANY has ordered 15 ingot cars from the Lorain Steel Company.

THE RAILWAY REFRIGERATOR CAR CORPORATION is inquiring for 100 refrigerator cars of 40 tons' capacity.

THE BOARD OF TRANSPORTATION, New York City, reported in the *Railway Age* of December 20 as contemplating the issuance of inquiries for miscellaneous service cars, is now inquiring for 16 cars as follows:

6 trailer flat cars
6 air dump cars
2 motor flat cars
1 trailer supply car
1 emergency pump car

PASSENGER CARS

THE ATCHISON, TOPEKA & SANTA FE has ordered 14 gas-electric rail motor cars, dividing the order as follows: three mail and smoking coaches, one mail, baggage and smoking coach, all to be 80 ft. long, and eight baggage and mail cars, 75 ft. long from the Pullman Car & Manufacturing Corporation; two mail and baggage cars, 80 ft. long, from the J. G. Brill company. Those ordered from the Pullman Car & Manufacturing Corporation will be equipped with 400-hp. power units supplied by the Electro-Motive Company, and those ordered from the J. G. Brill Company with 550-hp. power units supplied by the latter company. Inquiry for this equipment was reported in the *Railway Age* of November 8.

MACHINERY & TOOLS

THE ATCHISON, TOPEKA & SANTA FE is inquiring for 14 machine tools.

IRON & STEEL

THE CHICAGO & NORTH WESTERN has ordered 300 tons of structural steel for bridge work from the Worden Allen Company and the Milwaukee Bridge Company.

THE WESTERN PACIFIC has ordered 760 tons of structural steel for bridge work from the Virginia Bridge and Iron Company and the Bethlehem Steel Company.

THE CANADIAN PACIFIC has given an order to the Algoma Steel Corporation for 30,000 tons of 130-lb. R. E. H. F. (head free) rail. This rail is to be shipped to western lines for laying 150 miles of the company's Mountain subdivision.

THE ILLINOIS CENTRAL reports that 175 new industries were established in towns along its lines in 1930.

Continued on Next Left Hand Page

The Alloy Crews . . . Guardians of Quality

The alloy crews of Illinois Steel Company have a free hand in selecting the pick of the furnaces. Special mills and the best of everything are available for their use. Sure in their technique, exacting in their demands, the alloy crews are the best assurance of quality in Illinois Alloy Steels.

Illinois Steel Company

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

208 South La Salle Street, Chicago, Ill.

ILLINOIS *alloy* STEEL

Supply Trade

The Frost Railway Supply Company has moved its offices from the Penobscot building to the Union Guardian building, Detroit, Mich.

The West Allis Fuel & Supply Company, West Allis, Wis., has been appointed distributors in Milwaukee and Waukesha counties, of the products of the **General Refractories Company,** Philadelphia, Pa.

F. P. Brent, comptroller of the **American Locomotive Company,** has been appointed comptroller also of the **McIntosh & Seymour Corporation.** Mr. Brent will have his headquarters as formerly at New York.

L. R. Conolly, sales engineer, of the **MacLean-Fogg Lock Nut Company,** Chicago, has been granted leave of absence to serve as representative of the department of Exhibits, Chicago World's Fair Centennial Celebration in 1933.

R. H. Webb-Peploe, district manager of the **White Company** at New York, has been appointed regional vice-president, in charge of the Metropolitan region, with headquarters at Long Island City, N. Y.

Howard G. Gass, vice-president of the **St. Louis Car Company,** has been elected a director to succeed **George W. Scruggs,** who has resigned as secretary and treasurer. **Louis F. Gempp,** assistant treasurer, has been promoted to treasurer and **Edward J. Plowden,** assistant secretary, has been promoted to secretary. **John F. Tringle** has been appointed assistant treasurer.

Jesse V. Honeycutt, who has been sales agent in New York City for frogs, switches and railroad material, has been appointed manager of sales of frogs and switches, of the **Bethlehem Steel Company,** with office at Bethlehem, Pa. He succeeds to the place of **Neil E. Salsich,** who has resigned to become vice-president in charge of sales of the Jeffrey Manufacturing Company, Columbus, Ohio.

H. Hengeveld, who retired on January 1, as master painter of the Atlantic Coast Line, has become a member of the sales force of **The Lowe Brothers Company,** Dayton Ohio. Mr. Hengeveld, whose age is 70 years, was for 42 years in the service of the Atlantic Coast Line. For a number of years he has been a member of the committee of direction, Equipment Painting Section, American Railway Association.

Claus Greve, president of the **Cleveland Pneumatic Tool Company,** Cleveland, Ohio, has been elected chairman of the board; **L. W. Greve,** treasurer, has been elected president and **John DeMooy** has been elected treasurer. L. W. Greve is also president of its associated companies, the **Champion Machine & Forging Company** and the **Cleveland Rock Drill Company. H. W. Foster,** vice-president, **H. S. Covey,** secretary, and **Arthur Scott,** superintendent of the Cleveland Pneumatic Tool Company, were re-elected and **A. F. Barner** was appointed assistant secretary.

R. P. Allison, who has been appointed manager of the Schenectady (N. Y.) plant of the **American Locomotive Company,** entered the service of that company as an apprentice in 1896. He subsequently served as journeyman, assistant foreman and foreman until 1904 when he was appointed machine shop foreman with the Montreal Locomotive Works, Montreal, Canada, retaining that position until 1908 when he was appointed plant engineer. In 1916, Mr. Allison went to the Poole Engineering Company, Baltimore, Md., as works manager serving in that position until 1919 and then was appointed works manager for Hale & Kilbourne, Philadelphia, Pa. Two years later Mr. Allison was appointed general superintendent of the Richmond plant of the American Locomotive Company and in 1927 was promoted to manager of the same plant. In April, 1930, he was transferred as manager to the Dunkirk (N. Y.) plant of the American Locomotive Company which position he held at the time of his recent promotion to manager of the Schenectady plant.

John S. Stevenson who has been appointed manager of the Dunkirk (N. Y.) plant of the **American Locomotive Company** began work in 1891 as an apprentice in the shops of the Peninsular Car Company. He first served for five years in the templet shops and then for four years learning car building; he was then transferred to the engineering department of a new company formed by the consolidation of the Peninsular Car Company with the Michigan Car Company. In 1899 this company became a part of the American Car & Foundry Company and in 1901 he was transferred to the St. Louis mechanical department. He returned in 1902 to the Peninsular plant in the shop engineering department which position he held until the latter part of the same year when he went with the Russell Wheel & Foundry Company in charge of its car work. Mr. Stevenson returned to the service of the American Car & Foundry Company in 1912 and was in entire charge of the shop engineering of the Detroit plant until the close of the war when he became general superintendent of the same plant. In 1926, he was transferred to the New York office and since that time has been in charge of the general development work of the entire company until his recent appointment as manager of the Dunkirk plant of the American Locomotive Company.

R. B. McColl, who has been elected president and a director of the **McIntosh & Seymour Corporation,** Auburn, N. Y., was born in 1882 at Kilmarnock, Scotland, where he attended the Kilmarnock Academy and the Science and Art College. After serving a special apprenticeship and working in various departments on the Glasgow & Southwestern he was employed by Robert Stephenson & Sons, locomotive builders, Darlington, England, as a draftsman. In 1905 he went to the Montreal Locomotive Works, Montreal, Canada, and served in several departments until he became assistant superintendent, then superintendent of works and finally works manager. In 1917 he was appointed manager of the munition department of the Eddystone Munition Company, where he served until after the armistice. Returning to England he was appointed general manager of the Armstrong Witworth Company's locomotive department in charge of the building and equipping of the

R. B. McColl

locomotive works and of the sales, engineering and manufacturing of locomotives. Later, in addition, he was made general manager of the pneumatic tool department, gas and oil engine department and director of the Works board of all the company's plants which included shipbuilding and the construction of Diesel oil engines for marine work, etc. In January, 1922, Mr. McColl became attached to the New York office of the American Locomotive Company and the following June was appointed assistant manager of the Schenectady plant. In January, 1925, he was appointed manager of the plant which position he held at the time of his recent election as president of the McIntosh & Seymour Corporation.

Lima Locomotive Works, Inc., Annual Report

The Lima Locomotive Works, Inc., for the year ending December 31, 1930, reported a net income of $1,382,318, after allowance for depreciation and federal taxes, according to the annual report issued on February 2. The foregoing compares with a 1929 net income of $501,506, and a 1928 net loss of $111,606.

From the 1930 net income a dividend of $2 per share on the outstanding common stock has been declared, payable February 17. Joel S. Coffin, chairman, in commenting on this disbursement says "This is a special dividend and is not to be understood as a resumption of regular payments. Unless its business should materially increase in the near future, the company will necessarily

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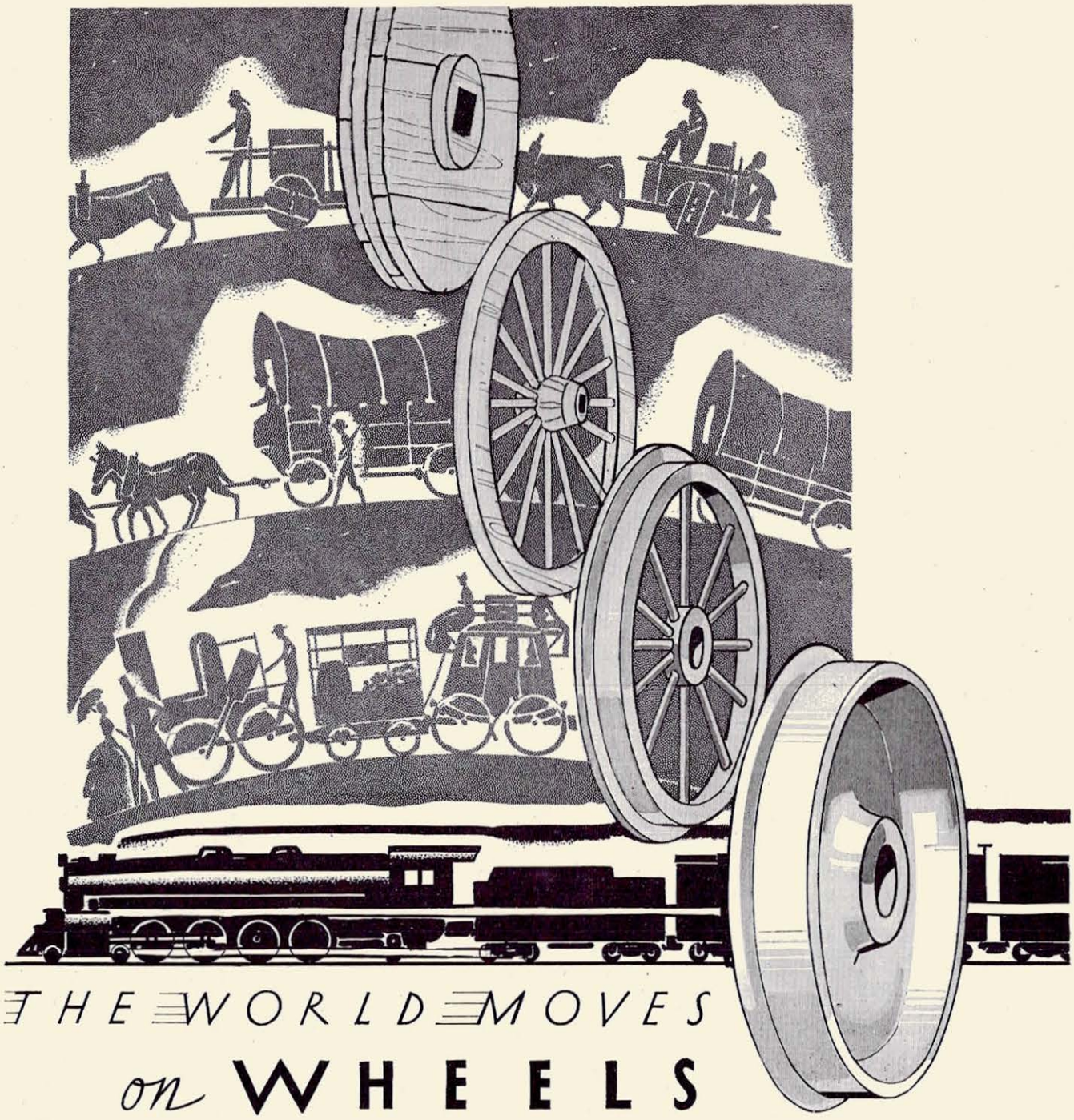

THE WORLD MOVES
on WHEELS

From the time man discovered that a rounded object rolls with comparative ease and devised the first crude cart, he has ever been on the move. His means of conveyance have undergone vast changes. The slow joggle of the oxcart has given place to the swift flight of the express train, but never has the wheel been supplanted as the basic factor of transportation. Instead, it has become more vitally important than ever. The speed and weight of modern transportation throw a tremendous responsibility on wheels. Significant then is the fact that Carnegie Wrought Steel Wheels are considered the standard of excellence in today's exacting service. To serve even more efficiently, we are now prepared to furnish Rim-Toughened Wrought Steel Wheels. The process of heat treatment to which these wheels are subjected insures additional service out of all proportion to the small increase in cost. Our wheel engineers will be glad to discuss this matter with you further.

CARNEGIE WROUGHT STEEL WHEELS

Product of Carnegie Steel Company, Pittsburgh, Pa. U.S. STEEL *Subsidiary of United States Steel Corporation* 119

conserve its working capital and surplus in order to be in position to care for its needs when additional orders are placed. The longer purchases are delayed, the greater will be the ultimate demand. Future dividend payments therefore will depend entirely upon the amount of business booked."

At the close of the year, the company had a surplus amounting to $4,262,579 as compared with a surplus of $2,882,558, on December 31, 1929.

The balance sheet as of December 31, 1930, lists current assets at $9,406,408 and current liabilities at $781,715, indicating an excess of $8,624,693 in current assets over current liabilities. The report calls attention to the fact that the current assets at the close of last year included $6,196,275 in cash and United States government securities as against a comparable figure of $2,944,903 for the previous year.

"The greater part of the business done during the year was booked the latter part of 1929 and early in 1930, after which there was a marked reduction in the amount of orders received," the report states. "The near-term prospects," it continues, "are still indefinite, but toward the close of the year several inquiries for equipment were made and a reasonable amount of business placed. While the volume of new business is not great, conditions should gradually improve in this respect during the current year."

General Railway Signal Company Annual Report

Net income of $2,432,350, after allowances for depreciation and taxes, was reported by the General Railway Signal Company for the year ending December 31, 1930, as compared with net income of $3,118,345 for the previous year. The 1930 profit was equivalent, after the payment of preferred dividends, to $7.07 per share on the company's common stock outstanding; in 1929 the earnings were equivalent to $8.25 on each of the outstanding common shares.

The balance sheet reveals that current assets at the close of last year amounted to $10,258,376, while current liabilities were listed at $2,483,534. The report states that the volume of orders booked in 1930 was 72 per cent of that in 1929, while the volume of unfilled orders on hand January 1, 1931, amounted to 80 per cent of those on hand at the opening of the previous year. "Installation of the major part of all the plants ordered in the last half of 1930 will be started shortly and all will be completed this year," the report states. "The constantly growing need for increased efficiency and economy of railway operation is chiefly responsible for the enlarging demand for your company's products. . . . ." it adds.

The report further reveals that during the year the company purchased 12,850 shares of its own common stock at an average cost of $76.27 per share making its total treasury holding of these shares 33,400 at an average cost of $78.80 per share. It is pointed out that the resultant saving in dividend payments on the basis of $5 per share equals 6.35 per cent on the stock purchase price.

The profit and loss and surplus accounts for the year ending December 31, 1930 are as follows:

Gross Operating Income, before Depreciation		$4,528,826
Selling, Administrative and General Expenses		1,288,179
		$3,240,647
Interest, Dividends and Miscellaneous Income		161,113
		$3,401,761
From which deduct:		
Depreciation and Amortization	$460,665	
Interest Charges on Temporary Loans	62,246	
Provision for State and Federal Taxes	446,500	
		969,411
Net Income for Year		$2,432,350
Dividends on Preferred Stock—6%	$170,004	
Less Dividends on Preferred Stock in Treasury	28,146	
		141,858
Balance available for Common Stock Dividends (Equivalent to $7.07 per Share on Common Stock Outstanding less in treasury, 324,100 Shares)		$2,290,492
Dividends on Common Stock—$5.00 per Share	$1,787,500	
Less Dividends on Common Stock in Treasury	130,438	
		1,657,063
Net Surplus for Year		$633,429
Earned Surplus as at December 31, 1929	$4,661,963	
Add Adjustments applicable to Prior Years	836	
		4,662,799
Earned Surplus as at December 31, 1930		$5,296,229
Paid-in Surplus		3,665,131
Total Surplus as at December 31, 1930		$8,961,360

OBITUARY

A cable message of January 30 announces the death of **Ernest Copeland Irving**, chief engineer of the British Power Railway Supply Company, London. Mr. Irving had been a member of the Signal Section, American Railway Association, and of the Institute of Railway Signal Engineers (England).

Orton Lee Prime, president of the Prime Manufacturing Company, Milwaukee, Wis., who died at Rochester, Minn., on January 14, was born on April 3, 1874, at Fall River, Wis. Mr. Prime attended St. John's Military Academy at Delafield, Wis., and Michigan University, at Ann Arbor, Mich. He served in the Spanish American War as a corporal in the second regiment Troop B, United States Cavalry. Early in 1900 Mr. Prime was president of the Prime Steel Company, Milwaukee, and in 1914 when the

Orton Lee Prime

Prime Manufacturing Company was formed Mr. Prime continued as president of the new company.

Henry Giessel, president of the Henry Giessel Company, Chicago, died in Park Ridge, Ill., on January 27. He was born on July 31, 1855 in Germany and came to the United States at the age of 12. After completing his education and serving his apprenticeship in the sheet metal trade, he began the manufacture of various metal specialties, including acetylene gas machines. During 1892 he began the manufacture of water filters for use on railroad dining cars and in 1914 formed the Henry Giessel Company to manufacture sanitary drinking water coolers, filters and auxiliary appliances for use on all types of railroad passenger equipment. He remained president of this company from the time of its inception until his death.

Henry Giessel

IT SEEMS LIKE A REVERSION TO THE DARK AGES to travel long distances by road when the essentials of travel—speed, safety, punctuality, comfort, and cuisine—can only be found on a well-managed railway.—Bazil Bazley in the "Sunday Times" (London).

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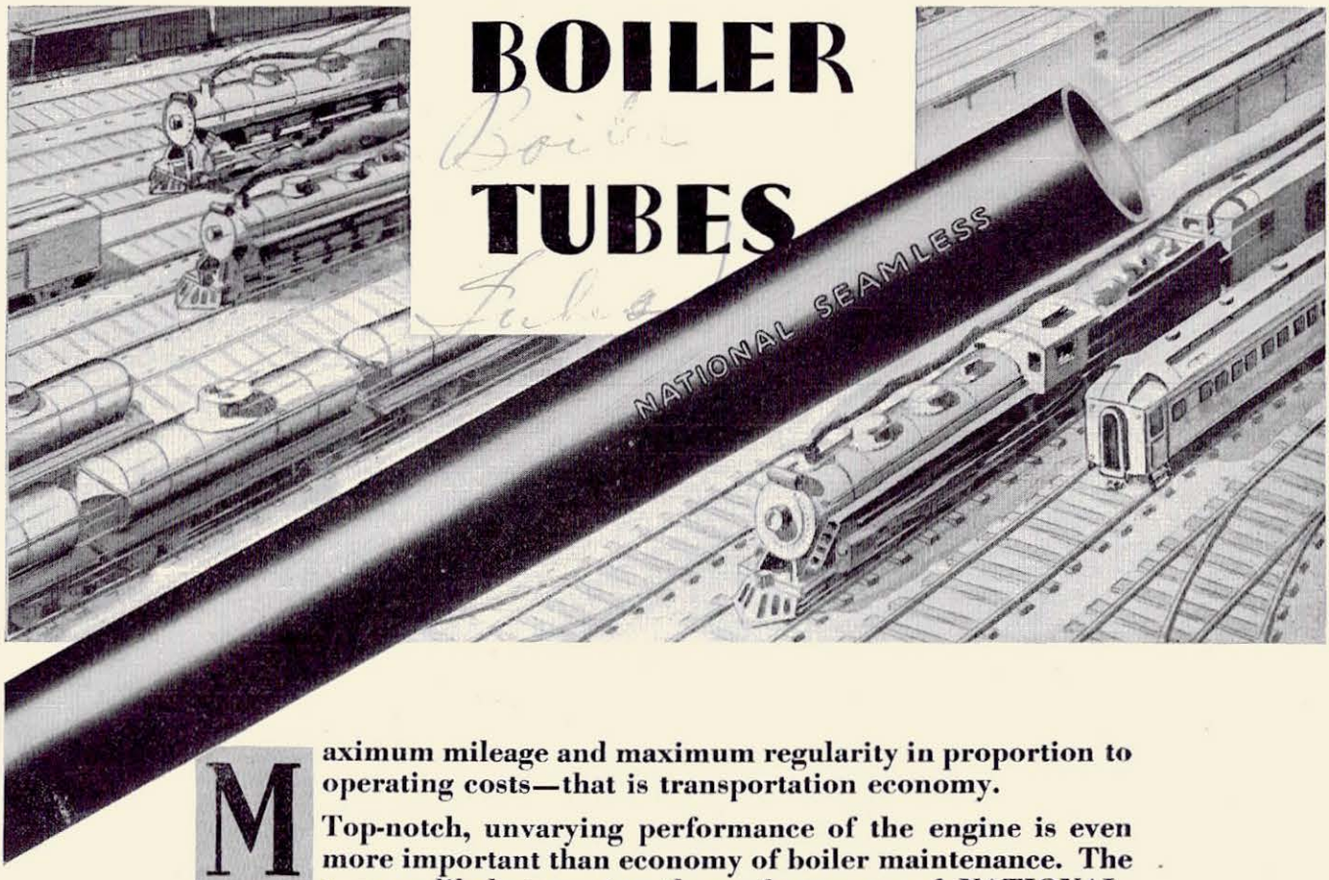
ROLL UP THE MILEAGE *with* GOOD BOILER TUBES



Maximum mileage and maximum regularity in proportion to operating costs—that is transportation economy.

Top-notch, unvarying performance of the engine is even more important than economy of boiler maintenance. The two are likely to go together, of course, and NATIONAL-SHELBY Seamless Boiler Tubes go very far to assure both. For the same qualities that make them lasting, make them also highly immune to costly disablements, interruptions, and delays.

Ductility, toughness, and strength are worked into these tubes by employment of the expertness, the facilities, and the organization of the largest manufacturer of tubular products in the world. They resist pitting and fatigue, hold tight in the flue sheet, and give lasting, efficient service. Ask for Bulletin 12, describing NATIONAL-SHELBY—

America's Standard Boiler Tubes

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

Subsidiary of United States Steel Corporation

NATIONAL SEAMLESS

Financial

ATCHISON, TOPEKA & SANTA FE.—*Bonds.*—The Interstate Commerce Commission has authorized the Clinton & Oklahoma Western to issue a first and refunding mortgage 6 per cent, series B, bond for $1,000,000 to be delivered to the Santa Fe in satisfaction of indebtedness. The Cane Belt has been authorized to issue a similar bond for $1,750,000, likewise to be delivered to the Santa Fe in satisfaction of indebtedness. The Osage County & Santa Fe has been authorized to issue a similar bond for $1,800,000 to be delivered to the Santa Fe.

CHICAGO GREAT WESTERN.—*Notes.*—The Interstate Commerce Commission has authorized this company to issue $3,681,603 of 5 per cent promissory notes, payable to the Pullman Car & Manufacturing Corporation in connection with the acquisition of cars.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority to acquire by purchase an undivided half interest in the line of the Longview, Portland & Northern from Longview to Chehalis, Wash., 24.6 miles, and to operate over the line of the Northern Pacific, or to build its own line, from Chehalis to Vader Junction, about 20 miles.

CHICAGO, ROCK ISLAND & PACIFIC.—*Dividend Postponed.*—Directors of this company have postponed action until March 4 on the quarterly dividend on its common stock. The stock has been paying $7 annually and last year's earnings averaged over $5.50 per share.

ERIE.—*Final Valuation.*—The Interstate Commerce Commission has issued a final valuation report as of 1918 finding the final value for rate-making purposes of all properties used by the Erie Railroad for common-carrier purposes to be $284,279,317, while the value of the Chicago & Erie was placed at $25,495,764, that of the New York, Susquehanna & Western at $14,979,331, and that of the New Jersey & New York at $1,619,500. The total capitalization as of valuation date was $391,702,584, and the book cost of road and equipment, including land, was $283,005,647.

KANSAS & OKLAHOMA.—*Sale at Auction.*—This railroad, extending between State Line, Kan., near Liberal, and Woods, 19 miles, has been purchased at public auction by C. M. Light of Liberal. The purchase price was $34,000 and involved the assumption of $12,000 of delinquent taxes. The company has been in receivership since April 18, 1923.

MICHIGAN CENTRAL.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue $4,000,000 of refunding and improvement mortgage 4½ per cent bonds, in respect of the retirement of a like amount of 5 per cent bonds secured by mortgage on properties formerly owned by the Detroit & Bay City, maturing March 1. The New York Central also asked authority to assume obligation and liability.

MISSOURI PACIFIC.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority for the issuance and sale of $61,200,000 of first and refunding mortgage 5 per cent bonds to a syndicate of bankers at 95 and interest. The proceeds are to be used in part to retire an issue of $42,874,000 of bonds of the St. Louis, Iron Mountain & Southern.

PHILADELPHIA & READING.—*Final Valuation.*—The Interstate Commerce Commission has issued a final valuation report as of 1917 finding the final value for rate-making purposes of the properties used by the P. & R. system for common-carrier purposes to be $233,755,958. That of the property owned and used was placed at $75,711,237, while that of the lines used but not owned was placed at $134,652,111. The book investment in road and equipment, including land, was $113,654,185, and the outstanding capitalization was $90,096,504.

PITTSBURGH & WEST VIRGINIA.—*Notes.*—The Interstate Commerce Commission has authorized this company to issue $2,200,000 of 4½ per cent short term notes in renewal of a maturity of equal amount.

ST. LOUIS-SAN FRANCISCO.—*Dividend Postponed.*—Directors of this company have postponed until March 4 action on the usual $2 quarterly dividend. Earnings in 1930 were slightly greater than $4 a share.

WEST RIVER.—*Road Reopened.*—Operation of this road has been resumed, following restoration of the track which was washed away and otherwise damaged in the Vermont flood of November, 1927. It is stated that the restoration of the track has been financed by a loan of $200,000 floated by the State legislature. The road extends from Brattleboro, Vt., on the Central Vermont, northwestward to South Londonderry, Vt., 35½ miles. It was formerly operated by the New London Northern (controlled by the Central Vermont) but these companies abondoned operation because of poor business, and in April, 1930, the Interstate Commerce Commission authorized the West River to operate the road.

Dividends Declared

Bangor & Aroostook.—Common, $.88, quarterly; Preferred, $1.75, quarterly, both payable April 1 to holders of record February 28.

Delaware & Hudson.—$2.25, quarterly, payable March 20 to holders of record February 26.

Maryland & Pennsylvania.—$2.00, quarterly, payable April 10 to holders of record March 31.

New York, Chicago & St. Louis.—Common and Preferred, $1.50, quarterly, both payable April 1 to holders of record February 10.

Pennsylvania.—$1.00, quarterly, payable February 28 to holders of record February 2.

Average Prices of Stocks and of Bonds

	Feb. 3	Last week	Last year
Average price of 20 representative railway stocks.	93.33	94.30	132.32
Average price of 20 representative railway bonds..	93.49	94.52	92.44

Construction

ATCHISON, TOPEKA & SANTA FE.—This company plans to construct a concrete, brick and steel passenger and freight station at Garnett, Kan.

BUREAU OF RECLAMATION.—A contract has been awarded by this bureau of the Department of the Interior to the Lewis Construction Co., Los Angeles, Cal., for the construction of a railroad from a junction with the Los Angeles & Salt Lake at Summit, Nev., near Boulder City, to the site of the Hoover dam on the Colorado river, 10 miles. The bid of $455,510 was less than the estimates of the government engineers. The contract provides that the work is to be completed during the latter part of August.

CANADIAN NATIONAL.—A contract for the foundations for the new station of this company at Saint John, N. B., has been awarded to B. Mooney & Sons, Ltd., of Saint John.

CHICAGO, ROCK ISLAND & PACIFIC.—A contract has been awarded to John Marsch, Inc., Chicago, for the construction of a new double-track main line around the freight yard at Trenton, Mo., involving a total expenditure of about $200,000. The project includes the excavation of about 650,000 cu. yd. of earth and 1,000 cu. yd. of rock.

ERIE.—The Public Service Commission of New York has approved an estimate of $128,700 for the elimination of the Starin avenue crossing of this road in Buffalo, N. Y.

NEW YORK CENTRAL-NEW YORK, CHICAGO & ST. LOUIS-PENNSYLVANIA.—The New York Public Service Commission has approved revised plans and a revised estimate of costs in the amount of $50,452 in connection with the elimination of the Athol Springs Road crossing in Hamburg, N. Y. This estimate covers the costs of the substructure and superstructure necessary to carry the tracks of these roads over the county highway.

PENNSYLVANIA.—A contract has been awarded to the M. A. Long Company, Baltimore, Md., for construction work on this company's new produce terminal building at Mt. Vernon yard, Baltimore. The amount involved is approximately $230,000. The new terminal was described in detail in the *Railway Age* of November 1, 1930, page 965.

TEXAS & PACIFIC.—This railroad and the City of Marshall (Tex.) plan the construction of a grade separation structure at North Grove street, Marshall, involving an expenditure of about $30,000.

TORONTO, HAMILTON & BUFFALO.—This company is taking bids for grade separation and subway work in connection with its track elevation and station improvement program at Hamilton, Ont., described in the *Railway Age* of October 11, 1930, page 780.

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1 SEAMLESS
2 EASILY WORKED AND WELDED
3 SUPERIOR RESISTANCE TO CORROSION

REG. U. S. PAT. OFF.
TONCAN
COPPER
Mo-lyb-den-um
IRON

■ These are the ideal qualities for a boiler tube. Every one of them is found in the boiler tube of Toncan Iron.

■ Here is an iron boiler tube without a weld. Seamless! With all that this means.

■ Moreover cold-working does not affect its corrosion resistance. It is easily expanded, rolled and welded.

■ Once in place it lasts longer due to the superior corrosion-resistance of the alloy of refined iron, copper and molybdenum that constitutes Toncan Iron.

■ Use this modern boiler tube and keep maintenance at a minimum.

Central Alloy Steel Division

REPUBLIC STEEL CORPORATION

Massillon, Ohio

Railway Officers

FINANCIAL, LEGAL AND ACCOUNTING

Birdsall A. McAllaster, land commissioner of the Southern Pacific with headquarters at San Francisco, Cal., has retired under the pension rules of the company after more than 53 years of railway service. Mr. McAllaster was born at Morristown, N. Y., on October 10, 1860, and obtained his academic education at the University of Kansas. He entered railway service at the age of 16 years as a warehouseman on the Kansas Pacific (now part of the Union Pacific) at Salina, Kan. From 1879 to 1890, he was a clerk in the local freight office of the Union Pacific at Kansas City, Mo., and in the land department of that road, and chief clerk of the latter department at Omaha, Neb. He was then promoted to land commissioner of the Union Pacific, becoming land commissioner of the Southern Pacific in 1908.

OPERATING

H. R. Gernreich, assistant superintendent of the Los Angeles division of the Southern Pacific at Los Angeles, Cal., has been transferred to the Western division at Oakland Pier, Cal.

The position of superintendent of the Pocatello (Idaho) terminal of the Oregon Short Line was abolished on February 1 and supervision of the yard and the passenger and freight stations at that point has been assumed by **R. A. Pierce,** general superintendent, with headquarters at Pocatello.

H. W. Walker has been appointed trainmaster on the St. Louis district of the Illinois Central at Carbondale, Ill., succeeding **C. F. Duggan,** who has been transferred to the Springfield district at Clinton, Ill. Mr. Duggan replaces **Frank Walker,** whose headquarters remain at Clinton, and who succeeds **W. A. Golze,** who retired from active service on February 1.

The Chicago, Milwaukee, St. Paul & Pacific, on February 1, combined the LaCrosse and River divisions into one division to be known as the LaCrosse & River division, comprising 609 miles of line. **O. H. Frick,** superintendent of the LaCrosse division at Portage, Wis., has been appointed superintendent of the combined division, with headquarters at LaCrosse, Wis. On the same date the Iowa & Minnesota division and the Southern Minnesota division were combined into one division to be known as the Iowa & Southern Minnesota division, made up of 905 miles of line. **G. A. Van Dyke,** superintendent of the Southern Minnesota division, has been appointed superintendent of the Iowa & Southern Minnesota division, with headquarters as before at Austin, Minn. **M. T. Skewes,** superintendent of the Iowa & Minnesota division and the River division, with headquarters at Minneapolis, Minn., has been appointed assistant superintendent of the Iowa & Southern Minnesota division, with headquarters at Austin.

J. C. White, who has been appointed superintendent of the Monongahela division of the Pennsylvania, as announced in *Railway Age* of January 17, page 219, was born on June 9, 1888, at Huntingdon, Pa. He was graduated from Pennsylvania State College in 1911, and entered railroad service with the Pennsylvania on June 17, 1912. His initial position with the road was that of chairman in the maintenance of way department on the Tyrone division. On October 1, 1912, he was promoted to rodman, and in May, 1916, was assigned a position in the assistant engineer's office at Altoona, Pa. In October, 1916, he was promoted to transitman and later to assistant supervisor. He served in that capacity from May, 1917, to November, 1919, on the Tyrone, Allegheny, Pittsburgh and Philadelphia divisions, respectively. In November, 1919, he was assigned to the Maryland division as assistant master carpenter. In March, 1921, he was transferred to the Philadelphia terminal division as assistant supervisor, and in May, 1922, he was transferred to the Baltimore division to act in the same capacity. In July, 1922, he was promoted to track supervisor and served as such on the Schuylkill and Middle divisions until January, 1928, when he was promoted to division engineer, serving in that capacity on the Richmond, Logansport and New York divisions, respectively. On January 16, 1931, he was promoted to superintendent of the Monongahela division.

Jasper N. Haines, whose appointment as general manager of the Lehigh Valley, with headquarters at Bethlehem, Pa., was announced in the *Railway Age* of January 17, page 219, was born at Pleasant Dale, W. Va., and was educated in the public schools and at Pittsburgh Academy. He commenced his railway career on July 8, 1892, with the Pittsburgh & Lake Erie as yard clerk at Turner, Pa., and until April 2, 1898, he served successively as stenographer and clerk to the trainmaster at Pittsburgh, Pa. On August 8, 1898, he entered the service of the Lehigh Valley as stenographer to the superintendent at Hazleton, Pa., and in May, 1902, he was appointed chief clerk. In July, 1903, he was transferred to Wilkes-Barre, Pa., as chief clerk to the superintendent of the Wyoming division. From October, 1904, to November, 1907, he served as clerk and later as chief clerk to the general manager at So. Bethlehem, Pa. On November 18, 1907, he was appointed inspector of transportation at Bethlehem, and on August 1, 1909, he became trainmaster at Auburn, N. Y. From January 1, 1910, to June 30, 1914, he was assistant superintendent at Sayre, Pa., and on the latter date he was promoted to superintendent. Mr. Haines moved to Bethlehem on July 23, 1918, and until his recent promotion has served successively in the positions of assistant to operating assistant, assistant to general manager, superintendent of transportation and general superintendent of transportation.

Jasper N. Haines

TRAFFIC

H. H. Gibson has been appointed general agent of the traffic department of the Chicago & Alton at New Orleans, La., succeeding **F. W. Birchett, Jr.,** who has been transferred to Peoria, Ill.

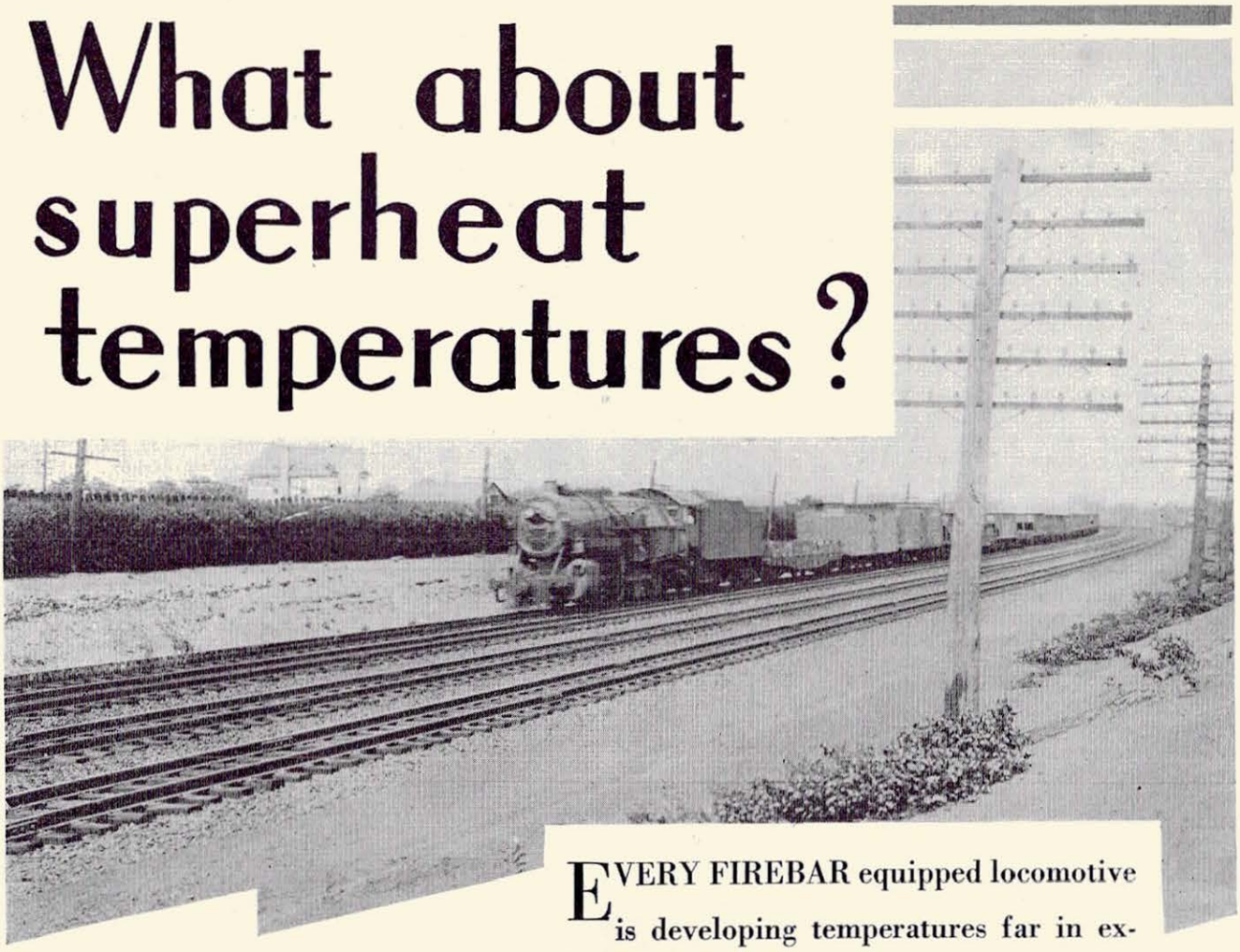
C. C. Weedin has been appointed assistant general freight agent of the Union Pacific System, with headquarters at Omaha, Neb., succeeding **C. W. Axtell,** who retired from active service on February 1.

William J. Sheridan, general western freight agent of the Buffalo, Rochester & Pittsburgh, has been appointed assistant general freight agent with headquarters as before at Buffalo, N. Y., succeeding **George A. Bowman,** who has retired on pension after 26 years of service. The position of general western freight agent has been abolished.

Charles B. Ryan, passenger traffic manager of the Seaboard Air Line, with headquarters at Norfolk, Va., retired effective February 1, and **G. Z. Phillips,** assistant passenger traffic manager, has been appointed to succeed Mr. Ryan. Mr. Ryan was born in Maysville, Ky., and received his education at Maysville Seminary. He entered railway service in 1880, with the Richmond & Petersburg (now the Atlantic Coast Line), as a clerk, later being promoted to ticket agent. In 1881 he became connected with the Chesapeake & Ohio as ticket stock clerk and in 1883 he was promoted to advertising clerk. From 1886 to 1891 he served as chief clerk in the general passenger department and in 1891 he was promoted to division passenger agent. In July, 1892, he was appointed assistant general passenger agent. In

Continued on Next Left Hand Page

What about superheat temperatures?



EVERY FIREBAR equipped locomotive is developing temperatures far in excess of those in locomotives equipped with other grates.

It is because

BETTER FIRES

not only provide greater firebox temperatures but pass along that heat for the superheat units to absorb. It is because the fires are thin.

FIREBAR

FIREBAR CORPORATION

CLEVELAND OHIO

June, 1902, he entered the service of the Seaboard Air Line as general passenger agent at Portsmouth, Va., and served in that capacity until March, 1920, when he became passenger traffic manager, the position he held until his retirement.

Mr. Phillips was born in Washington, D. C., and received his education at Georgetown University. Except for the period between 1899 and 1901, when he was connected with the Southern, his entire railway service has been with the Seaboard Air Line. He undertook the position of passenger agent for the S. A. L. at Washington, D. C., on February 1, 1901. He later served as traveling passenger agent at New York, and then, at Washington, D. C., as district passenger agent. He also served as general passenger agent of the Old Bay Line, operating between Baltimore, Md., Old Point Comfort, Va., Norfolk and Portsmouth, and later was sent to Jacksonville, Fla., as assistant general passenger agent of the Seaboard Air Line, which position he held until he was promoted to assistant passenger traffic manager at the same point. For a time he served as assistant to the president, with headquarters at Baltimore, Md., and Jacksonville, Fla., and later he returned to Washington, D. C., as general agent. On July 1, 1930, he was appointed assistant passenger traffic manager at Norfolk, Va., the position he held until his recent promotion to passenger traffic manager.

The Missouri-Kansas-Texas Lines, on February 1, established the office of freight traffic manager in Texas in order to handle adequately the increasing proportion of Katy traffic which originates or is destined to points in that State and the Southwest, through a ranking system traffic officer who is thoroughly conversant with the rate and traffic situations and will be in a position to maintain close relations with the shipping interests and the public. **Joseph F. Garvin,** freight traffic manager, who has had his headquarters at St. Louis, Mo., with an office at Dallas, has been transferred to this newly created position, with headquarters at Dallas. **Ralph C. Trovillion,** general freight agent at St. Louis, has been promoted to freight traffic manager, with headquarters at the same point. **D. J. Collins,** assistant general freight agent, has been promoted to general freight agent at St. Louis, succeeding Mr. Trovillion.

Mr. Trovillion, freight traffic manager at St. Louis, has been in railway service for 22 years. He was born at Golconda, Ill., on August 26, 1887, and attended the Western Military Academy at Alton, Ill. In 1905 he obtained his first railway experience as a stenographer and rate clerk on the Chicago & Alton at St. Louis. During 1907 and 1908 Mr. Trovillion was engaged in the real estate business, returning to railroad work in 1909 as a stenographer on the Katy at St. Louis. For the following seven years he advanced through various minor positions in the traffic department, then serving during 1918 as a second lieutenant in the air service of the United States Army. He returned to the Katy in 1919 and was promoted to assistant general freight agent at St. Louis in 1920. Mr. Trovillion had been general freight agent since 1924, his promotion to freight traffic manager becoming effective on February 1.

Ralph C. Trovillion

Mr. Collins has been in the service of the Missouri-Kansas-Texas for more than 31 years. He obtained his first experience on that road in October, 1899, as a messenger boy in the local freight house at St. Louis. He was advanced through various positions in the local freight office and the commercial office to the position of chief clerk in the freight traffic department on March 1, 1922. Mr. Collins was promoted to assistant general freight agent on April 1, 1924, his further promotion to general freight agent at St. Louis becoming effective on February 1.

D. J. Collins

ENGINEERING AND SIGNALING

J. F. Swenson, division engineer of the Middle division of the Pennsylvania at Altoona, Pa., has been appointed to succeed **J. C. White,** promoted, as division engineer of the New York division, with headquarters at Jersey City, N. J. Mr. Swenson has in turn been succeeded by **H. W. Anderson,** division engineer of the Atlantic division at Camden, N. J. **Spencer Danby,** division engineer of the Cumberland Valley division at Chambersburg, Pa., has been transferred, in the same capacity, to Camden, and his position on the Cumberland Valley division has been filled by the promotion of **N. R. Hunter,** track supervisor on the Philadelphia terminal division.

MECHANICAL

As announced in the *Railway Age* of January 24, page 259, **C. A. Gill,** superintendent of motive power, Eastern lines, of the Baltimore & Ohio, has been granted a year's leave of absence to fill the position of chief consulting engineer of the government-operated railroad system of the Union of Socialistic Soviet Republics. Mr. Gill, whose headquarters will be at Moscow, will have particular charge of the motive power and other equipment problems of the Soviet system.

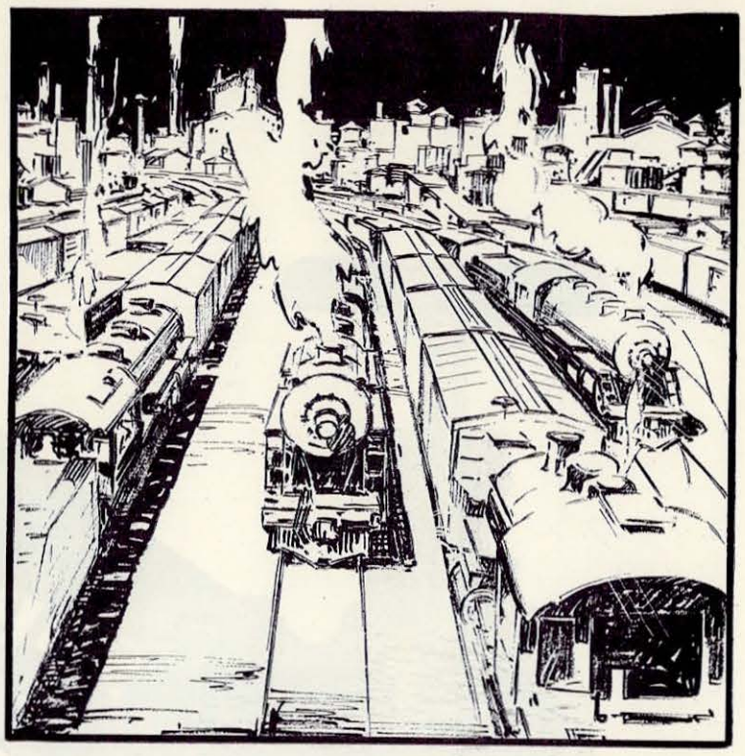
OBITUARY

Edwin Osgood, who retired from active service in 1900 as stationery storekeeper of the Chicago & North Western, with headquarters at Chicago, died at the West Suburban hospital, Oak Park, Ill., on January 29 of injuries received in a fall a month previous.

Peter Vliet, inspector of telegraph and telephones of the Wheeling & Lake Erie, died on the Dixie highway, just south of Covington, Ky., on January 23, when he suffered a heart attack and the automobile which he was driving crashed into a telephone pole. Prior to November 1, 1930, Mr. Vliet served for about 15 years as superintendent of telegraph and telephones of the W. & L. E., with headquarters at Brewster, Ohio.

Thomas W. Flannagan, assistant to the vice-president and general manager of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Minneapolis, Minn., died at his home in St. Paul on January 30 after an illness of nearly two years. Mr. Flannagan was born in England in 1863. He was educated in a grammar school at Manchester, England, and graduated from Victoria University in 1884. In 1887 he entered railway service as a rodman on the Northern Pacific, five years later becoming a resident engineer on the Soo Line. In 1898 he was advanced to track and maintenance of way engineer, then being appointed storekeeper in 1901, with headquarters at Minneapolis. Mr. Flannagan was promoted to general storekeeper in 1909, a position he held until his promotion to assistant to the general manager in 1920. He was appointed assistant to the vice-president and general manager in 1926.

NOW Is The Time!



NOW is the time to get your locomotives in shape - - Equip them with dependable wear-resisting parts made of HUNT-SPILLER *Air Furnace* GUN IRON.

The wear-resisting qualities of HUNT-SPILLER *Air Furnace* GUN IRON will help you obtain maximum efficiency from your locomotives, prevent road failures, reduce fuel consumption, lower repair costs, and insure greater earnings during that period of recovery that is on the way.

Now is the time to check over your stock of H S G I Castings.

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Reg. U. S. Trade Mark

Cylinder Bushings
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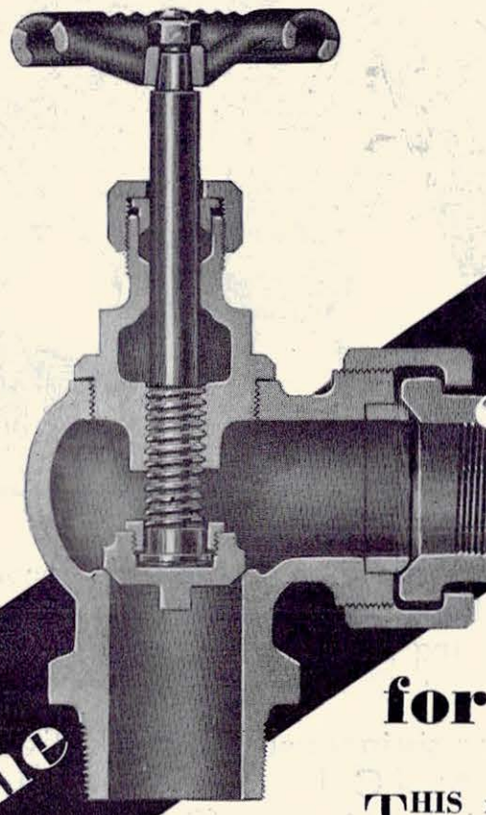


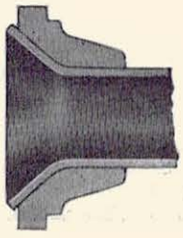
The Super Steam Valve

an Improved Design for Modern Conditions

THIS new steam throttle valve for air compressors, while designed primarily for locomotives using high pressure superheat steam, has superior advantages that warrant its general use.

The valve is rugged and durable. There is but one standard size, which can be used with any size steam pipe merely by applying the proper swivel—thus affording decided economies in stock keeping.

The body of the valve is made of cast steel to withstand pressures up to 500 lbs.—and is so marked. Internal parts are made of well-known alloys that have high tensile strength and will resist corrosive action of steam, up to 700° superheat.



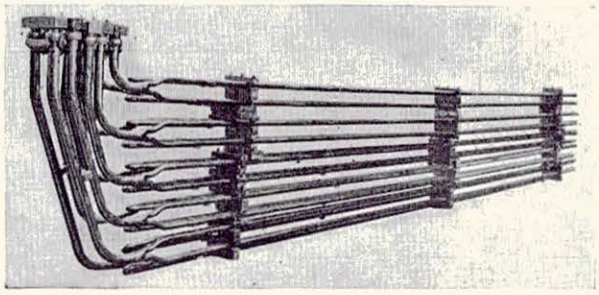
Swivels for either iron pipe or copper tube are available in various sizes . . .

Complete information about the Super Steam Valve is contained in Circular Notice 1094—a copy of which is yours for the asking . . . WESTINGHOUSE AIR BRAKE CO., General Office and Works, Wilmerding, Pa.

Visualize What The Superheater Does —

and Give It

the Attention It Deserves.



Typical Type "E" Superheater Unit Assemblies

THE Application of the Elesco superheater to steam locomotives in this day and age is a matter of routine. It has long been established as an essential to good locomotive and boiler performance.

But in many instances, from a maintenance standpoint, it has not yet received the same consideration given to the locomotive as a whole. Time and money are spent on classified repairs to boilers and running gear, but the superheater is patched up. The superheater should receive *equal* attention.

Stop a moment and visualize what the superheater does, and its effect on locomotive performance. Doesn't it deserve the very best of care and attention?

Keeping it maintained in first-class condition doesn't cost much when you figure the average service life. Thousands of superheater units still in use have given 15 years of service—only 7 per cent depreciation. What other boiler part, subjected to the same conditions and treatment, nets a comparable return? But that is asking too much from any fire-touched surface of a boiler. Provision should be made to replace superheater units after ten years of service.

At the Elesco plant, we maintain a service to the railroads, whereby we "remanufacture" old, unserviceable superheater units. They go through the same process as new units and come back ready to serve you another long period. And, that feeling of uncertainty and probable engine failure is left on the scrap pile.

THE SUPERHEATER COMPANY

60 East 42nd Street
NEW YORK

ELESCO

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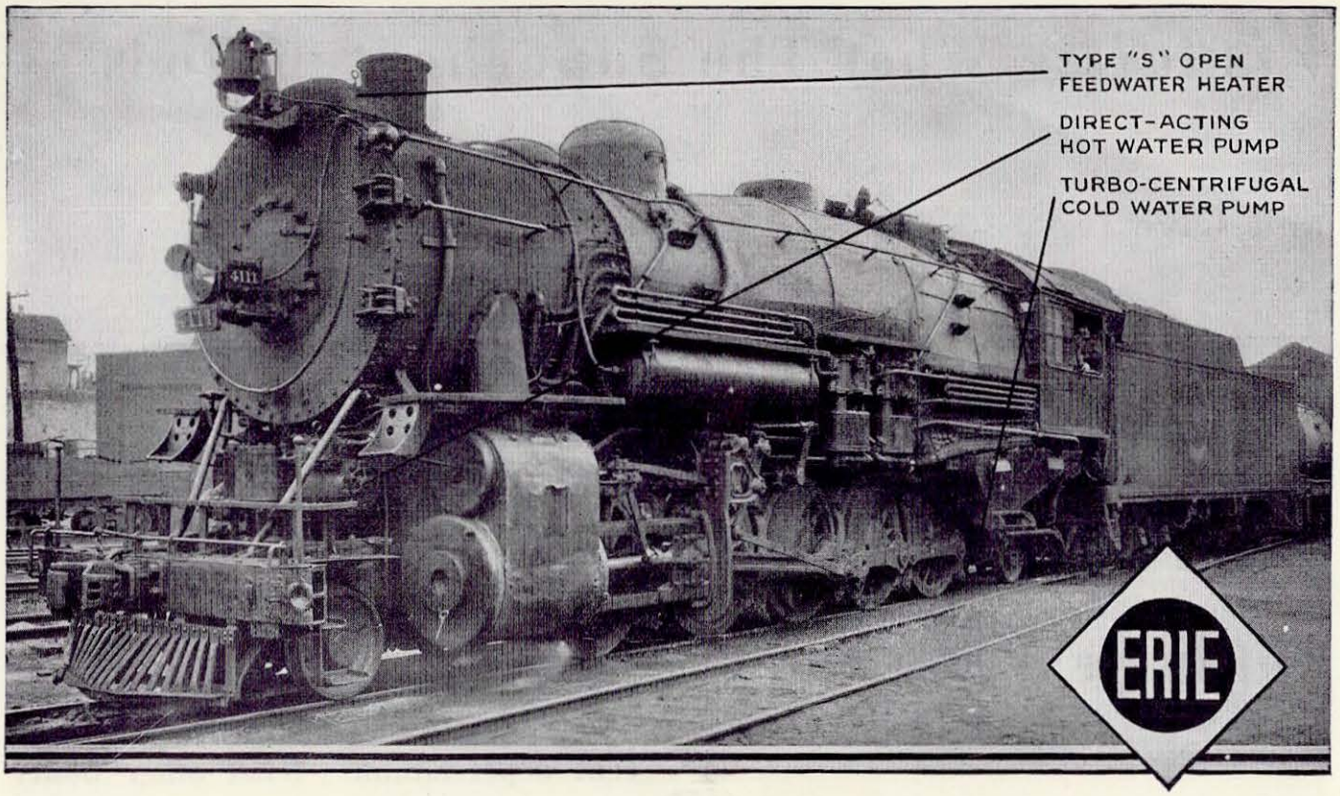
Canada: THE SUPERHEATER COMPANY, Limited, Montreal

Superheaters
Exhaust Steam Injectors

Feed Water Heaters
Superheated Steam Pyrometers

A-575



On the ERIE... 217 Worthington Feedwater Heaters

THE ERIE RAILROAD is equipping ten more locomotives with Worthington Open Type Feedwater Heaters, bringing the total to 217. Thus Worthington continues to help this railroad to live up to its maxim of "Fast Service".

All roads continually seek means of economy... and Worthington Equipment has proved, in repeated tests, its ability to save 12% of fuel and 14% of water. Fewer stops for fuel and water mean faster schedules and larger profits.

Further economies, in maintenance and extended locomotive life, result from the use of Worthington Heaters... through the removal of 80% to 90% of corrosive oxygen from the water, and the reduction of scale accumulation by purification and by keeping the scale-making elements out of the boiler.

Illustrated bulletin W-220-B2 contains the whole story on Worthington Locomotive Heating Equipment. Write for a copy.

PUMPS
All Sizes... All Types
For All Services
Any Capacity... Any Pressure
COMPRESSORS
Stationary and Portable
CONDENSERS
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DIESEL ENGINES
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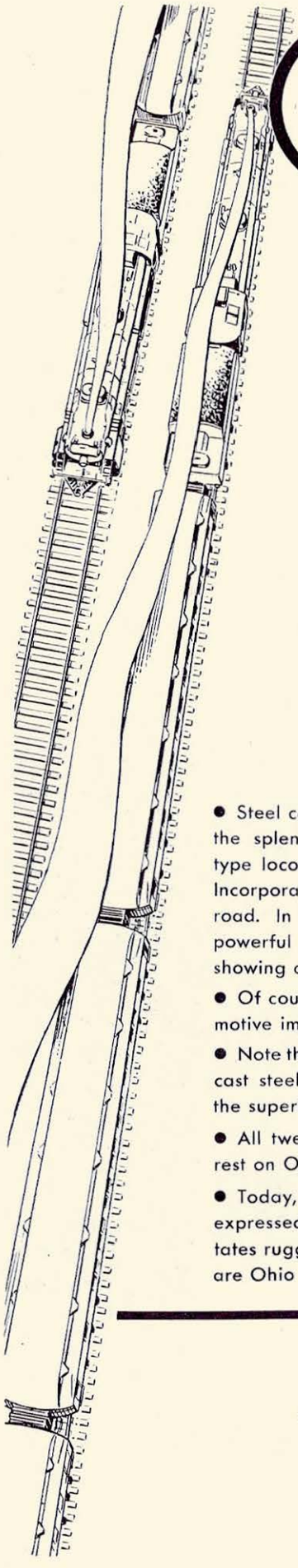
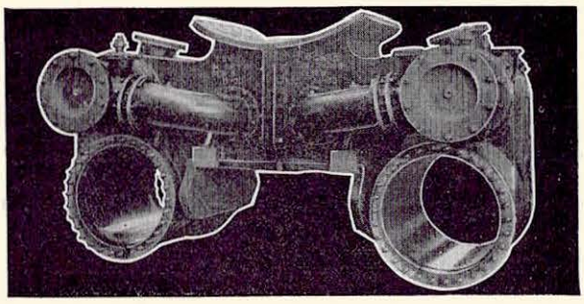
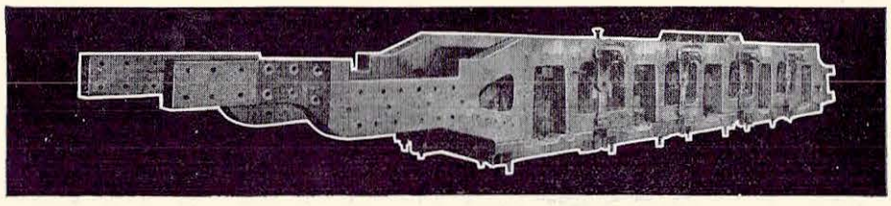


On the 21 Lima-Built Chicago Great Western Locomotives...

CAST STEEL CYLINDERS

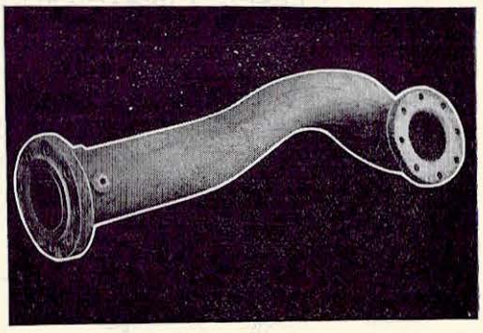


UNDERSTRUCTURES



- Steel castings by Ohio are playing their part in the splendid performance of twenty-one 2-10-4 type locomotives built by Lima Locomotive Works, Incorporated, for the Chicago Great Western Railroad. In service, these locomotives—30% more powerful than the road's heaviest engines—are showing a fuel saving of 27%.
- Of course, the cylinders are cast steel— a locomotive improvement in which Ohio pioneered.
- Note the unusual and difficult design of the Ohio-cast steel high pressure steam pipe running from the superheater header to the cylinders.
- All twenty-one of these Lima-built locomotives rest on Ohio-cast steel understructures.
- Today, the earning capacity of a locomotive is expressed in horsepower. High horsepower necessitates rugged locomotive material, well made. Such are Ohio steel castings.

AND CAST STEEL PIPES BY OHIO



THE OHIO STEEL FOUNDRY CO.
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Plants: Lima, Ohio; Springfield, Ohio and Bay City, Michigan

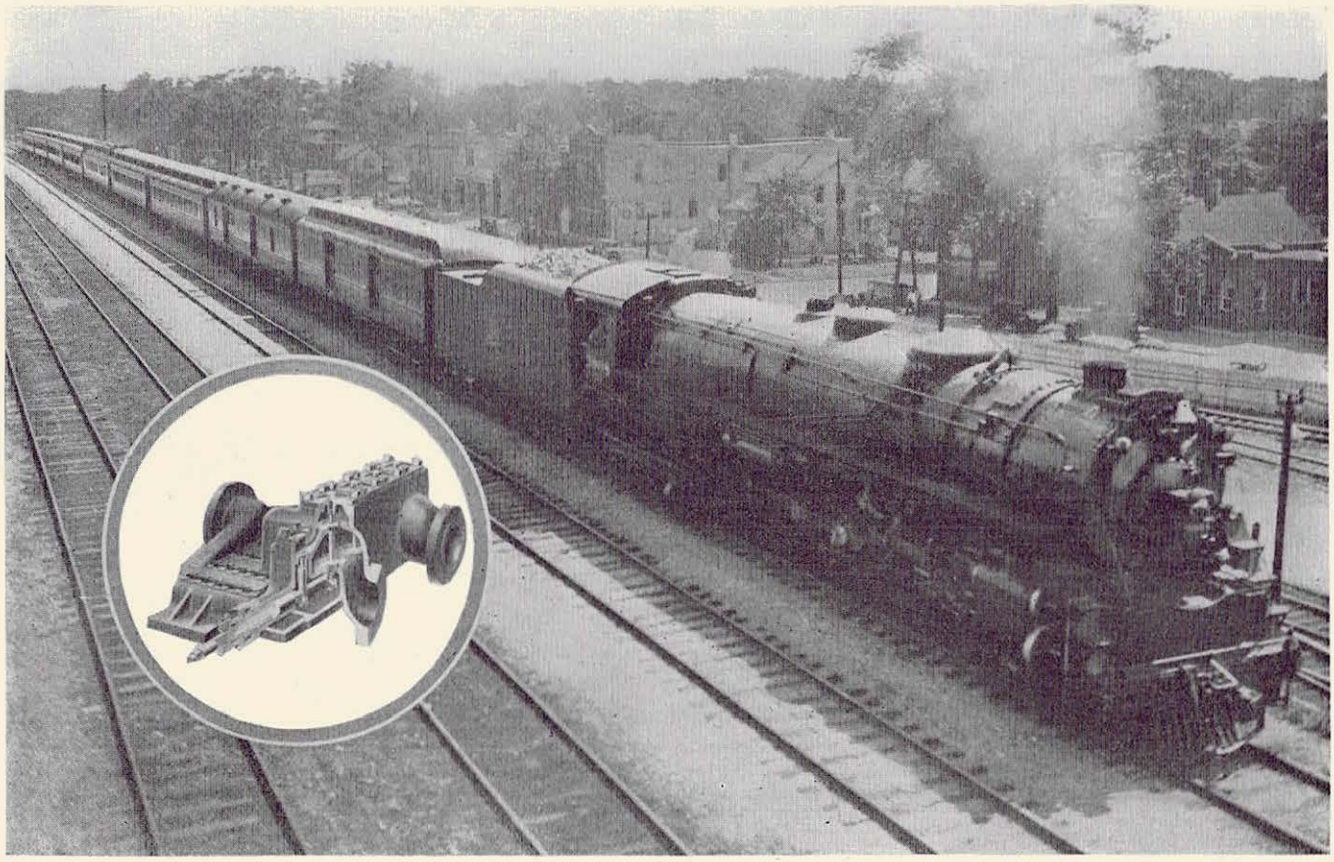
OHIO

The "Columbine"

The "Columbine", operated jointly by the Chicago & North Western and the Union Pacific between Chicago and Denver, has recently been re-equipped and offers many innovations for the comfort and enjoyment of Pullman and day-coach passengers.

The "Columbine" is pulled on the Chicago & North Western by modern 4-8-4 type locomotives developing maximum horsepower for sustained periods and maximum operating efficiency.

A feature in the equipment of these locomotives is the American multiple throttle cast integrally with the type "E" superheater header. No additional weight is added over and above the dome throttle which it replaces, and it also makes superheated steam available for the auxiliaries at all times. Ease of handling is a feature—an essential for power used on trains of this type, where the comfort and safety of passengers must be given paramount consideration.



AMERICAN THROTTLE COMPANY, Inc.

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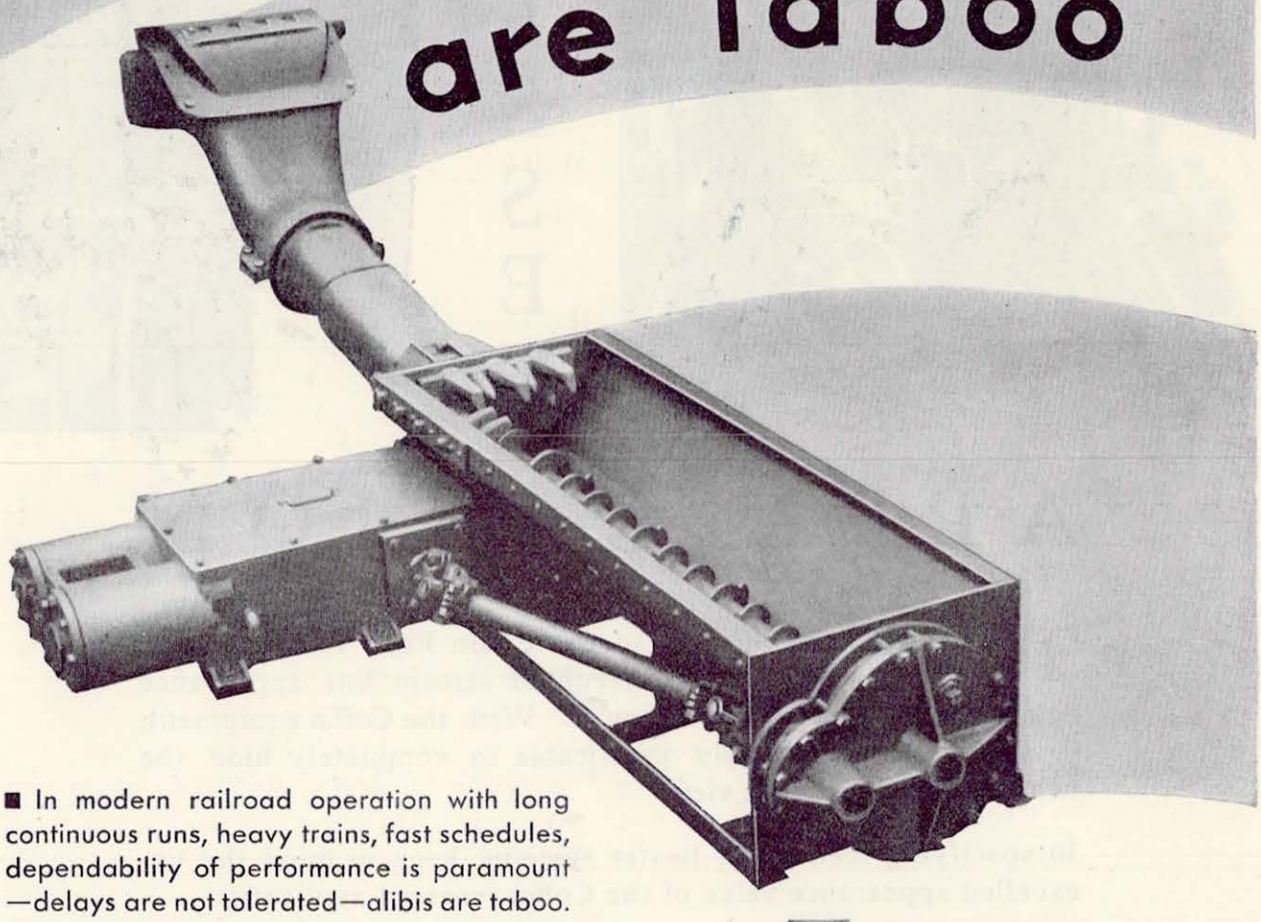
ALIBIS are Taboo



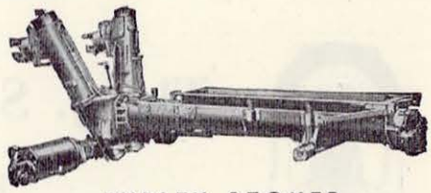
■ In modern railroad operation with long continuous runs, heavy trains, fast schedules, dependability of performance is paramount —delays are not tolerated—alibis are taboo.

■ On the country's longest runs, in every class of service, Standard Stokers are daily demonstrating their reliability and dependability.

■ Under all conditions of operation, with coal varying at different division points from lump to slack, bone dry or soaking wet, Standard Stokers are showing their ability to maintain full steam pressure at all times.

■ Standard Stoker fired power can be depended on to develop its full boiler capacity that brings the train through on schedule time.

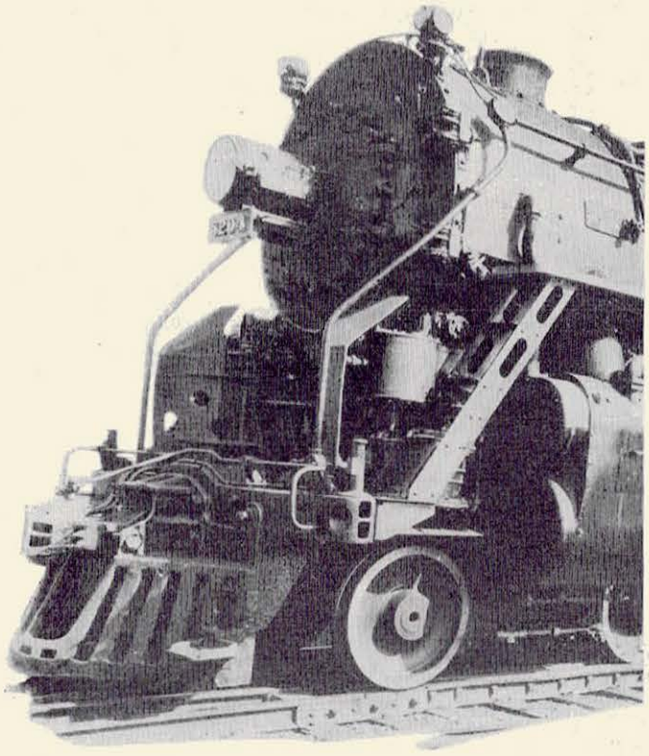
TYPE "B" STOKER



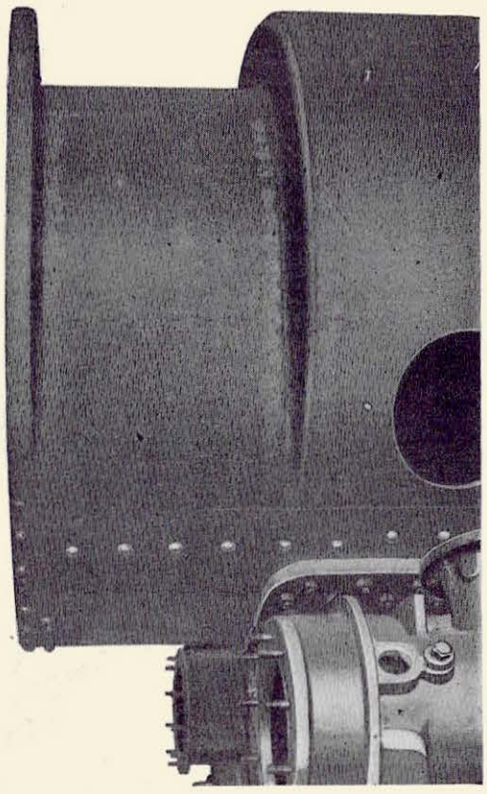
DUPLEX STOKER

THE STANDARD STOKER COMPANY, Inc.

NEW YORK CHICAGO ERIE



RECESSED



APPLICATION

THE recessed application of the Coffin Feed Water Heater System retains the uninterrupted stream line appearance demanded of modern motive power. With the Coffin equipment, it is possible and entirely practicable to completely hide the heater and piping from view.

In specifying feed water heater systems, keep in mind the unexcelled appearance value of the Coffin recessed application.

Where appearance is not a vital factor, the Coffin extended application equals in appearance the methods employed in applying other feed water heater systems.

"Results Not Price Determine Cost"

The J. S. Coffin, Jr., Company

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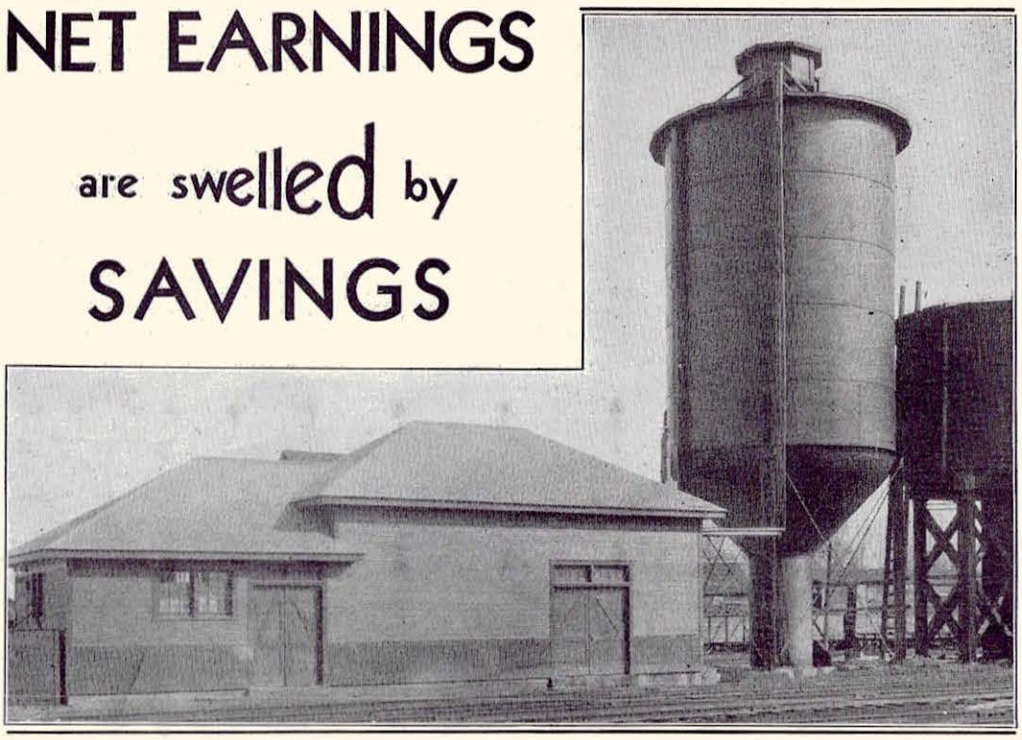
NET EARNINGS are swelled by SAVINGS



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There is no way that earns profits faster than by effecting savings in operating costs. Every dollar of operating savings is operating profits.

Properly conditioned water means savings in fuel, reduction of maintenance costs and other economies all down the list of operating expenses.

And the investment in Graver Water Treating Equipment that makes these savings possible is so small in comparison with its earnings.

Hundreds of Graver Railroad installations are successful expense savers. Let us give you an estimate of cost to meet your requirements. There's no obligation, of course.

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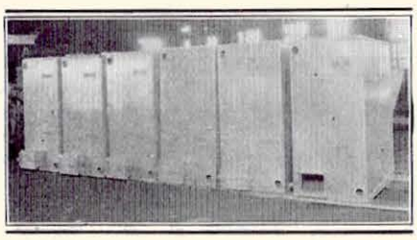

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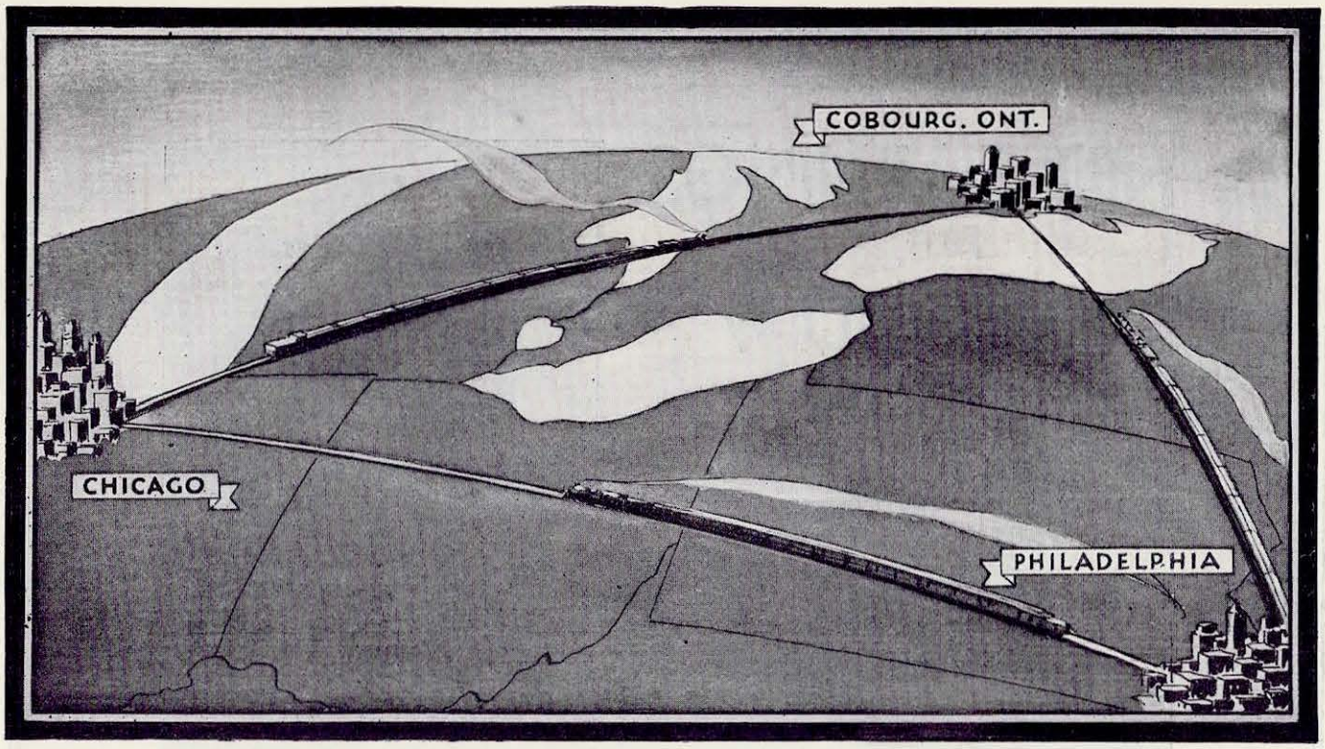
WATER SOFTENING EQUIPMENT



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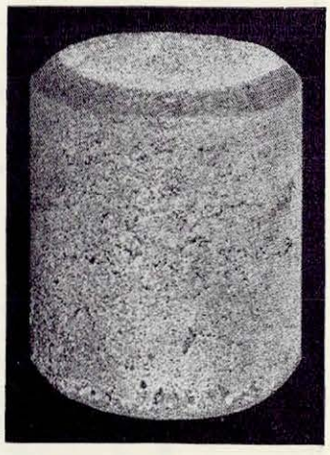

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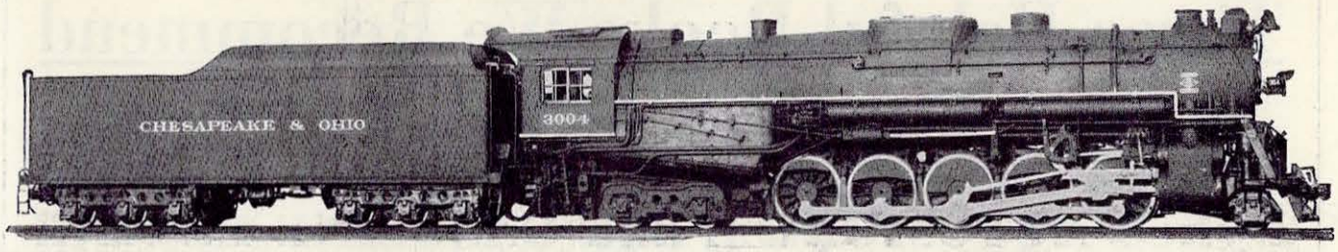

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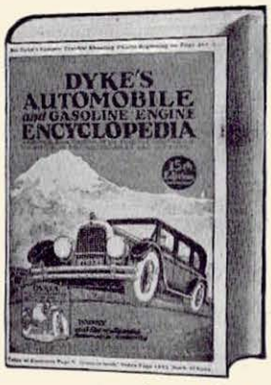

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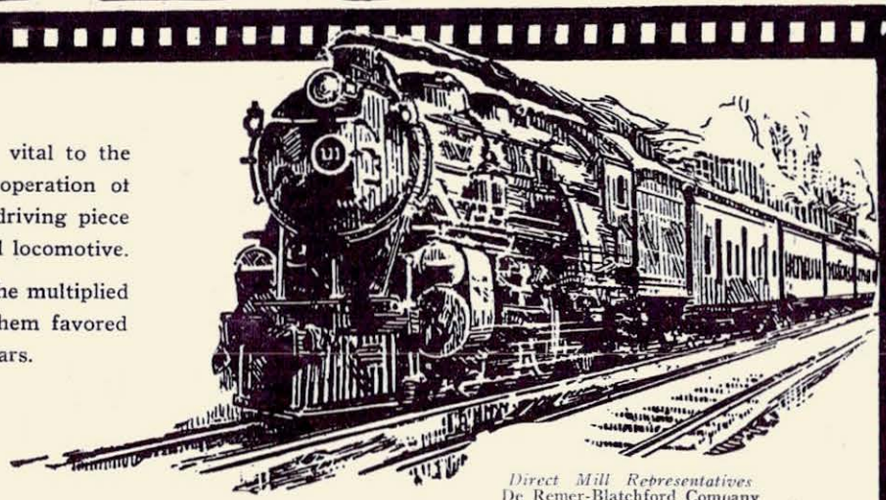

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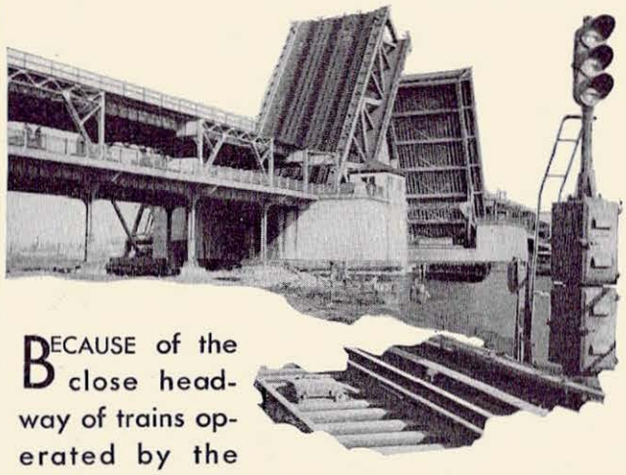

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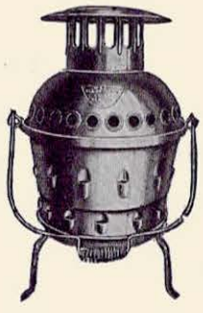

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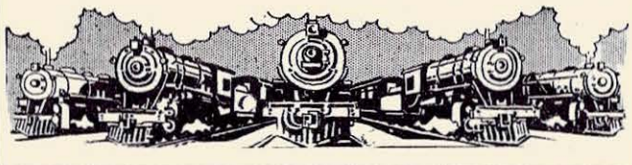

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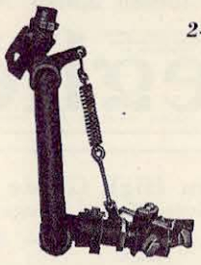

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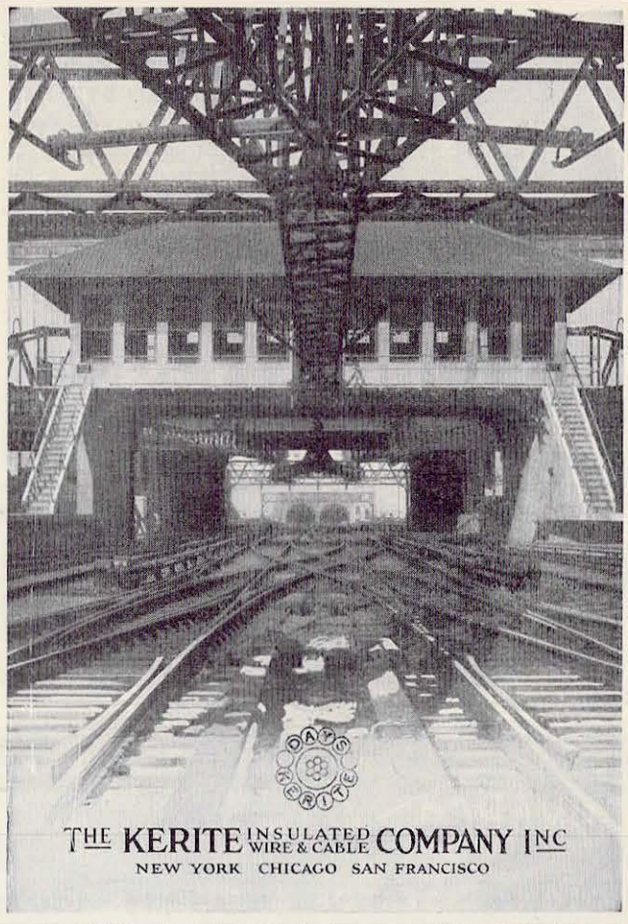

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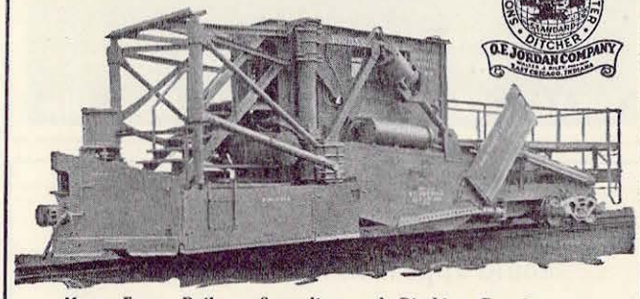

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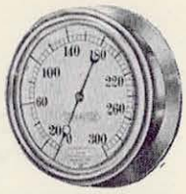

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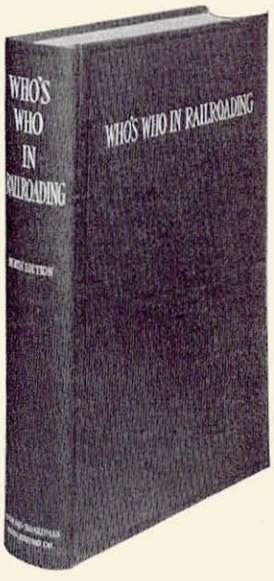

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Aircraft Streamline & Round Tubing.
Aluminum Co. of America.

Air Lifts.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Airport Drainage.
Armco-Culvert Mfrs. Assoc.
Republic Steel Corp.

Air Pumps.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Air Reservoir Joints—(See Joints, Air Reservoir).

Alloy Steel.
Bethlehem Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Ryerson & Son, Inc., Jos. T.

Alloys.
Electro Metallurgical Sales Corporation.

Alloys, Strong Aluminum
Aluminum Co. of America.
General Cable Corp.

Angle Bars — (See Joints, Rail).

Angles, Channels and Tees—(See Shapes, Structural).

Anti-Creepers, Rail.
Bethlehem Steel Co.
P. & M. Company, The.

Arch, Locomotive Brick.
American Arch Co.

Arresters, Lightning.
General Electric Co.
General Railway Signal Co.
P. & M. Company.
Railroad Supply Co., The
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Ash Conveyors.
Industrial Brownhoist Corp.

Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Ash Pans, Cast Steel.
General Steel Castings Corp.

Auxiliary Locomotive.
Bethlehem Steel Company.

Axles, Car and Locomotive.
American Locomotive Co.
Baldwin Locomotive Works
Bethlehem Steel Corp.
Carnegie Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Midvale Co., The
National Railway Appliance Co.
Standard Steel Works Co.

Axles, Mine Car.
Brill Co., The J. G.
Mt. Vernon Car Mfg. Co.

Axles, Motor Trucks.
Timken-Detroit Axle Co.

Babbitt Metal.
National Bearing Metals Corp.
Ryerson & Son, Inc., Jos. T.
Westinghouse Elec. & Mfg. Co.

Baggage Door Controller Device.
Edwards Co., O. M.

Barges, Steel.
American Bridge Co.

Bars, Concrete, Reinforcing.
Carnegie Steel Co.
Central Alloy Steel Corp.
Illinois Steel Co.
Inland Steel Co.
Interstate Iron & Steel Co.
Ryerson & Son, Joseph T.

Bars, Iron and Steel.
Carnegie Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Illinois Steel Co.
Inland Steel Company.
Interstate Iron & Steel Co.
Lockhart Iron & Steel Co.
McConway & Torley Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Bars, Rolled Steel.
Carnegie Steel Co.

Batteries, Lighting.
Electric Storage Battery Co.

Batteries, Starting.
Electric Storage Battery Co.

Batteries, Storage.
Electric Storage Battery Co.
Railroad Supply Co.
Safety Car Heating & Lighting Co.

Batteries, Wet Cell.
Electric Storage Battery Co.

Beams, Channel & Angle.
Carnegie Steel Co.
Illinois Steel Co.

Bearings, Axle Generator.
S. K. F. Industries, Inc.
Westinghouse Elec. & Mfg. Co.

Bearings, Ball Thrust.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The

Bearings, Center.
Brill Co., The J. G.
Chicago Railway Equipment Co.
Miner, W. H.
Pressed Steel Car Co.
Stucki Co., A.
Symington Co., The.

Bearings, Journal.
Fafnir Bearing Co.
Magnus Co., Inc.
National Bearing Metals Corp.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The

Bearings, Journal Roller.
Fafnir Bearing Co.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The

Bearings, Roller.
American Steel Foundries Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Miner, W. H.
Shafer Bearing Corp'n.
S. K. F. Industries, Inc.
Standard Car Truck Co
Stucki Co., A.
Timken Roller Bearing Co.,
Wine Railway Appliance Co.

Bearings, Roller Side.
Q. & C. Company, The
Standard Coupler Co.

Bearings, Side.
American Steel Foundries.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
Standard Car Truck Co.
Wine Railway Appliance Co.

Beds, Cast Steel, Locomotive.
General Steel Castings Corp.

Bell Ringer, Locomotive.
Ardco Mfg. Co.
Prime Mfg. Co., The

Bells, Highway Crossing.
Railroad Supply Co.

Belt Lacing Machines.
Birdsboro Steel Foundry & Mach. Co.

Benders, Rail.
Q & C Co., The

Bending and Straightening Machines.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.

Billets, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Interstate Iron & Steel Co.
McConway & Torley Co.
Midvale Co., The
Ryerson & Son, Jos. T.
Republic Steel Corp.
Standard Steel Works Co.

Blocks, Chain.
Barco Mfg. Co.
Yale & Towne Manufacturing Co.

Blocks, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
International Creosoting & Constr. Co.
Jennison-Wright Co.

Blooms, Steel.
Carnegie Steel Co.
Republic Steel Corp.
Interstate Iron & Steel Co.

Blow Pipe Systems, Pneumatic.
Mahon Co., R. C.

Blower Fittings, Automatic Smokebox.
Barco Mfg. Co.

Blowers, Soot.
Rees Mfg. Co.

Blowers, Turbo.
Ingersoll-Rand Co.

Blow Off Line Joints, Roundhouse—(See Joints, etc.)

Blowtorches, Acetylene.
Oxweld Railroad Service Co., The

Boiler Checks.
Prime Manufacturing Co., The

Boilers, Locomotive.
American Locomotive Co.
Baldwin Locomotive Works
Lima Locomotive Works.

Boilers, Scale Proof.
Industrial Brownhoist Corp.

Bolsters, Steel.
American Steel Foundries.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Gould Coupler Co., The
Mt. Vernon Car Mfg. Co.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Symington & Son, Inc., T. H.

Bolsters, Steel.
Ohio Steel Foundry Co., The.

Bolts and Nuts.
Bethlehem Steel Co.
Buffalo Brake Beam Co.
Dardelet Threadlock Corp.
Neely Nut & Bolt Co.
Russell, Burdsall & Ward Bolt and Nut Co.
Ryerson & Son, Joseph T.
Westinghouse Elec. & Mfg. Co.

Bolts & Nuts, Monel Metal.
International Nickel Co., The.

Bolts, Patch.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Bolts, Track.
Illinois Steel Co.
Inland Iron & Steel Co.

Bonders, Rail.
Q & C Co., The.

Bonding Rail Outfits.
Ingersoll-Rand Co.

Bonds, Rail.
American Steel & Wire Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Bonds, Signal.
American Steel & Wire Co.
General Cable Corp.
Railroad Supply Co.

Bond Wire Protection.
P & M Co., The

Boosters, Locomotives.
Franklin Railway Supply Co., Inc.

Boring & Drilling Machines, Horizontal.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Boring Machines, Car Wheel.
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Horizontal.
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Vertical.
Sellers & Co., Inc.. Wm.

Braces, Rail.
Bettendorf Co., The
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
Q. & C. Co., The.
Ramapo Ajax Co.
Symington Co., The.

Brake Beam Safety Guards.
Chicago Railway Equipment Co.

Brake Beam Supports.
American Steel Foundries.
Brill Co., The J. G.
Chicago Railway Equipment Co.
Davis Brake Beam Co.

Brake Beams.
American Steel Foundries.
Bradford Corporation.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Davis Brake Beam Co.
Hunt-Spiller Mfg. Corp.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.

Brake Drums.
American Car & Foundry Motors Co.
Hunt-Spiller Mfg. Corp.

Brake Forgings, Pins, Levers, etc.
American Steel Foundries.
Brill Co., The J. G.
Davis Brake Beam Co.
Mt. Vernon Car Mfg. Co
Schaefer Equipment Co

Brakes, Hand.
National Brake Co.

Brake Heads.
American Steel Foundries.
Brill Co., The J. G.
Chicago Railway Equipment Co.
Davis Brake Beam Co.
Pressed Steel Car Co.

Brake Jaws.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Schaefer Equipment Co.
Steel Car Forge Co.

Brake Shoes.
American Brake Shoe & Foundry Co.
American Steel Foundries.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Fort Pitt Malleable Iron Co.
Mt. Vernon Car Mfg. Co.
Wheel Truing Brake Shoe Co.

Brake Shoes, Wheel Truing.
Locomotive Finished Material Co.

Brakes, Air.
General Electric Co.
Westinghouse Air Brake Co.

Brakes, Clasp.
American Steel Foundries.

Brakes, Electric.
Westinghouse Air Brake Co.

Brakes, Hand.
Miner, W. H.
National Brake Co.
National Malleable & Steel Castings Co.
Wine Railway Appliance Co.

Brass, Sash.
Edwards Co., O. M.

Brick, Locomotive Arch.
American Arch Co.

Bridge Builders.
American Bridge Co.
Bethlehem Steel Company.

Bridge Floors.
Armco Culvert Mfrs. Assoc.

Bridge & Crossing Plank, Creosoted.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Bridge Flooring.
Carey Co., The, Philip.

Bridge Material.
International Creosoting & Construction Co.

Bridge Material, Creosoted.
National Lumber & Creosoting Co.

Bridge Stringers — (See Stringers, Bridge).

Bronze Powder, Aluminum.
Aluminum Co. of America.

Bucket Handling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Whiting Corporation.

Buckets, Grab.
American Bridge Co.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Buffers, Friction.
Edgewater Steel Co.
Miner, W. H.
Standard Coupler Co.
Waugh Equipment Co.
Westinghouse Air Brake Co.

Buffers, Radial.
Franklin Railway Supply Co., Inc.

Building Materials.
Carey & Co., Philip, The.
Johns-Manville Corp.

Buildings, Iron, Steel & Steel Concrete.
American Bridge Co.
United Engineers & Constructors, Inc.

Bulldozers.
Ryerson & Son, Joseph T.

Buses, Motor.
Reo Motor Car Co.

Bushings, Grease Cup.
Prime Mfg. Co., The.

Cable Accessories, Electrical.
General Cable Corp.
Graybar Electric Co.

Cables, Electric.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Cable Corp.
General Electric Co.
Graybar Electric Co.
Ketrie Insulated Wire & Cable Co.
Okonite Co., The.

Cableways—(See Tramways)

Caps, Grease.
Prime Mfg. Co., The.

Carbide Calcium.
Oxweld Railroad Co., The
Union Carbide Sales Co.

Car Insulation.
Carey & Co., Philip, The.

Car Lighting Equipment—(See Lighting Car Equipment).

Carlines.
Hutchins Car Rfg. Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Car Material, Wood.
Central Coal & Coke Co.

Car Parts and Appliances.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Car Parts, Freight.
Bettendorf Co., The.
General American Tank Car Corporation.
Pressed Steel Car Co.

Car Parts, Passenger.
Brill Co., The J. G.
St. Louis Car Co.

Car Repairs.
General American Tank Car Corporation.
Pressed Steel Car Co.
St. Louis Car Co.
Tennessee Coal, Iron & Railroad Co.

Car Retarder Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Car Siding (See Siding Car, etc.)

Cars, Baggage.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Cars, Ballast.
Bethlehem Steel Company.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Caboose, Coal & Stock.
Mt. Vernon Car Mfg. Co.

Cars, Convertible.
Mt. Vernon Car Mfg. Co.

Cars, Dump.
Bethlehem Steel Company.
Bettendorf Co., The
Differential Steel Car Co.
Magor Car Corporation.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Flat, Narrow Gauge.
Bettendorf Co., The.
Western Wheeled Scraper Co.

Cars, Freight.
Bethlehem Steel Co.
Bettendorf Co., The
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Co.

Cars, Freight (New and Repaired).
Bethlehem Steel Company.
Bettendorf Co., The.
Pressed Steel Car Co.

Cars, Gasoline-Electric.
Brill Co., The J. G.
Electro-Motive Co.
St. Louis Car Co.

Cars, Gasoline Motor.
Brill Co., The J. G.
St. Louis Car Co.

Cars, Hand & Push.
Fairbanks-Morse & Co.

Cars, Industrial.
Bethlehem Steel Company.
Brill Co., The J. G.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Motor.
Fairbanks-Morse & Co.

Cars, Motor Inspection.
Fairbanks-Morse & Co.

Cars, Oil Electric.
Westinghouse Elec. & Mfg. Co.

Cars, Ore.
Brill Co., The J. G.
Pressed Steel Car Co.

Cars, Passenger.
Bethlehem Steel Company.
Brill Co., The J. G.
Electro Motive Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.
St. Louis Car Co.

Cars, Power Units.
Brill Co., The J. G.
Electro Motive Co.

Cars, Quarry.
Western Wheeled Scraper Co.

Cars, Rebuilt and Repaired.
Bettendorf Co., The
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Refrigerator.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Cars, Second-Hand.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Self-Propelled Passenger.
Brill Co., The J. G.
Electro Motive Co.
General Electric Co.
Pullman Car & Mfg. Corp.
Westinghouse Elec. & Mfg. Co.

Cars, Spreader.
Jordan Co., O. F.
Western Wheeled Scraper Co.

Cars, Tank.
Bethlehem Steel Company.
General American Tank Car Corp.
Pressed Steel Car Co.

Carts, Dump.
Western Wheeled Scraper Co.

Castings, Alloy Steel.
Symington Co., The
Union Spring & Mfg. Co.

Castings, Brass and Bronze.
General Railway Signal Co.
Magnus Co., Inc.
National Bearing Metals Corp.
Union Switch & Signal Co.

Castings, Gray Iron.
American Brake Shoe & Foundry Co.
American Locomotive Co.
Baldwin Locomotive Works
General Railway Signal Co.
Locomotive Finished Material Co.
Mt. Vernon Car Mfg. Co.
Rampo Ajax Corp.
Union Switch & Signal Co.

Castings, Gun Iron.
Hunt-Spiller Mfg. Corp.

Castings, Iron & Steel.
Industrial Brownhoist Corp.

Castings, Malleable Iron.
Buckeye Steel Castings Co.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
P & M Company, The.
Pressed Steel Car Co.
Symington Co., The
Universal Draft Gear Attachment Co.

Castings, Monel Metal.
International Nickel Co., The.

Castings, Steel.
Allegheny Steel Co.
American Locomotive Co.
American Steel Foundries.
Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Mach. Co.
General Steel Castings Corp.
Gould Coupler Co., The
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Mach Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Catchbasins, Corrugated Iron.
Armco Culvert Mfrs. Assoc.

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Phillip, The.

Center Plates — (See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain Monel Metal.
International Nickel Co. The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.

Chemicals, Cleaning.
Oakite Products, Inc.

Chemists.
Bird-Archer Co., The
Dearborn Chemical Co.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium.
Electro Metallurgical Sales Corp.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Flanging.
Ryerson & Sons, Jos. T.

Clamps, Guard Rail.
O. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Cleaners, Aircraft.
Oakite Products, Inc.

Cleaners, Air Pump.
Oakite Products, Inc.
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Oakite Products, Inc.

Cleaners, Car.
Oakite Products, Inc.

Cleaners, Flue.
Ryerson & Son, Jos. T.

Cleaners, General.
Oakite Products, Inc.

Cleaners, Locomotive.
Oakite Products, Inc.

Cleaners, Metal.
Oakite Products, Inc.

Clips, Wire Rope.
American Hoist & Derrick Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, Second-Hand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
Fairbanks-Morse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Cocks, Cylinder.
Prime Manufacturing Co., The.

Columns, Water.
Prime Manufacturing Co., The.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp.

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The
General Electric Co.

Compounds, Cleaning.
Oakite Products, Inc.

Compounds, Cutting.
Oakite Products, Inc.

Compounds, Grinding.
Oakite Products, Inc.

Compounds, Paint Removing.
Oakite Products, Inc.

Compounds, Rust Proofing.
Oakite Products, Inc.

Compressors, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Floor Slabs.
Federal American Cement Tile Co.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Sons, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections.
Prime Manufacturing Co., The.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Clark Tructractor Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash — (See Coal Ore and Ash Handling Mach.)

Coupler Pockets—(See Draft Yokes.)

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton, Crane & Shovel Co.

Cranes, Diesel.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Grab Bucket.
American Hoist & Derrick Co.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
American Hoist & Derrick Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
American Hoist & Derrick Co.
Clark Tructractor Co.

Orton Crane & Shovel Co.

Cranes, Tractor.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Cranks).

Creosote.
American Creosoting Co.
Century Wood Preserving Co.
International Creosoting & Constr. Co.
Jennison Wright Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms.
American Bridge Co.
General Electric Supply Corp.
Graybar Electric Co.
International Creosoting & Construction Co.

Cross Ties.
Century Wood Preserving Co.
International Creosoting & Construction Co.

Cross Ties, Creosoted.
American Creosoting Co.
Century Wood Preserving Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks.
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings — (See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Railroad Sales Co.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts Corrugated.
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Paved Invert.
Armco Culvert Mfrs. Assoc.

Cupolas, Foundry.
Hammett, H. G.

Cups, Oil.
Hammett, H. G.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Curtains, Cab
Lehon Co., The

Curtains & Fixtures, Car Window.
Pantasote Co., Inc., The.

Curtain Material, Car.
Ryerson & Son, Jos. T.

Cutting & Welding Apparatus.
Oxweld Railroad Service Co.
Westinghouse Elec. & Mfg. Co.

Cut-Off Indicators & Recorders.
National Tube Co.
Valve Pilot Co.

Cylinder Parts (Finished & Rough).
Locomotive Finished Material Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.
Union Steel Casting Co.

Cylinders, Locomotive.
Locomotive Finished Material Co.

Cylinders, Oxy-Acetylene.
Oxweld Railroad Co., The

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.

Diesel Electric Power Plants
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditchers.
American Hoist & Derrick Co.
Jordan Co., O. F.

Ditching Machinery.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures—(See Fixtures Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Folding, Rolling and Sliding.
Kinnear Manufacturing Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Steel.
Kinnear Manufacturing Co.

Doors, Rolling, Steel.
Kinnear Mfg. Co.
Mahon Co., R. C.

Doors, Wood.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The.

Draft Gears.
American Steel Foundries.
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft, Yokes
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co., The
Universal Draft Gear Attachment Corp.

Draglines.
Orton Crane & Shovel Co.

Drainage Gates.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic.
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drinking Cups.
U. S. Envelope Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Elec. & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Drying Ovens.
Mahon Co., R. C.

Dynamos — (See Generators Electric).

Electrical Cable Accessories.
General Cable Corp.
General Electric Supply Corp.

Electric Cables.
Anaconda Wire & Cable Co.
General Cable Corp.
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
Lowe Bros. Co., The
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic, Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec. Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Envelopes.
U. S. Envelope Co.

Excavators.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Explosives.
American Steel & Wire Co.

Extinguishers, Fire.
Pyrene Manufacturing Co.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Coffin, Jr., Co., The J. S.
Worthington Pump & Machinery Corp.

Fence Posts.
International Creosoting & Construction Co.

Fencing Wire — (See Wire Fence).

Fence Posts, Creosoted.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro Molybdenum.
Electro Metallurgical Sales Corp.
Vanadium Corp. of America

Ferro Silicon.
Vanadium Corp. of America.

Ferro Tungsten.
Vanadium Corp. of America.

Ferro Vanadium.
Vanadium Corp. of America.

Filters, Air.
Westinghouse Air Brake Co.

Filters, Dust.
Whiting Corporation.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants, (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg. Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Jennison-Wright Co.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Creosoted.
Central Coal & Coke Co.

Flooring, Wood.
Central Coal & Coke Co.
Century Wood Preserving Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler — (See Tubes Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries.
Bethlehem Steel Company.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The

Frames, Cast Steel, Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Mach. Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Mach. Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Company.
Continuous Rail Crossing Corp.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Gasoline.
Railroad Supply Co.
Whiting Corporation.

Furnaces, Rivet Heating — (See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America.

Gage Testers—(See Testers Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Car Lighting.
Safety Car Heating & Lighting Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Graphite Penetrating Oil.
Alemite Mfg. Corp.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Greases.
Alemite Mfg. Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.

Guard Rails, Creosoted Wood
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Company.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.

Hangers, Car Door — (See Fixtures, Car Door).

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Westinghouse Electric & Mfg. Co.

Heaters, Electric Rivet.
American Hoist & Derrick Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Vapor Car Heating Co., Inc.
Westinghouse, Electric & Mfg. Co.

Heating Equipment, Car.
Safety Car Htg. & Ltg. Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Safety Car Htg. & Ltg. Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & Son, Jos. T.

Hoists, Electric.
American Hoist & Derrick Co.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoists, Second-Hand.
Hyman-Michaels Co.

Hoisting Machinery.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.
Milwaukee Electric Crane & Hoist Corp.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Ice Cutters.
Jordan Co., O. F.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off.
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Mach. Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Interstate Iron & Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
Anaconda Wire & Cable Co.
General Cable Corp.
General Electric Supply Corp

Insulation, Car.
Carey Co., Philip, The.
Lehon Co., The.

Insulation, Car Bldg.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Electrical.
General Cable Corp.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.

Iron, Forging Billets.
Lockhart Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co.
Interstate Iron & Steel Co.
Lockhart Iron & Steel Co
Reading Iron Co.
Ryerson & Son, Jos. T.

Jacking, Locomotive
Carey Co., Philip, The.

Jacks, Smoke.
Carey Co., Philip, The.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal.
Armco Railroad Sales Co.
Truscon Steel Co.

Lathes, Axle.
Sellers & Co., Inc., Wm.

Lathes, Engine.
Ryerson & Son, Joseph T.

Lathes, Wheel.
Sellers & Co., Inc., Wm.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.
Safety Car Htg. & Ltg. Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.
Safety Car Htg. & Ltg. Co.

Lighting Plants, Gas, Electric
Sunbeam Electric Mfg. Co.

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks).

Locomotive Water Conditioners.
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.

Locomotives, Gas-Electric.
Electro Motive Co.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb & Co., Geo. D.

Locomotives, Rebuilt.
American Locomotive Co.

Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Second-Hand.
Hyman-Michaels Co.

Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotive Stokers.
Standard Stoker Co.

Locomotive Valve Pilot.
Valve Pilot Co.

Lubricants.
Alemite Mfg. Corp.

Lubrication Equipment.
Alemite Mfg. Corp.

Lubrication Systems.
Alemite Mfg. Corp.

Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.

Lubricators, Piston Rod.
Q & C Co., The.

Lumber.
Central Coal & Coke Co.
Curtin-Howe Corp.
West Coast Lumber Trade Extension Bureau.

Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lumber, Creosote Treated.
International Creosoting & Construction Co.

Lumber, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
Jennison-Wright Co.
National Lumber & Creosoting Co.

Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Machine Screws, Monel Metal
International Nickel Co., The.

Magnets, Lifting.
Industrial Brownhoist Corp.
Electro Metallurgical Sales Corp.

Mechanical Draft Apparatus—(See Heating and Vent. App.)

Mechanical Stokers.
Standard Stoker Co.

Melters, Snow, Electric.
Q & C Co., The.

Metallic Flexible Conduit.
General Electric Supply Corp.

Meters, Water & Oil.
Worthington Pump & Machinery Corp.

Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.

Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.

Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Molybdenum Metal.
Vanadium Corp. of America.

Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.

Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Motors & Generators.
Fairbanks-Morse & Co.

Moulding.
Aluminum Co. of America.

Multiple V Belt Drives
Worthington Pump and chinery Corp.

Nails.
American Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Nipples, Air Hose.
Prime Manufacturing Co.

Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.

Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.

Nuts—(See Bolts and Nuts).

Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.
Reliance Mfg. Co.

Nuts, Tank Hose.
Prime Manufacturing Co., The.

Office Appliances.
Remington-Rand Business Service

Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp.

Oil, Linseed.
National Lead Co.

Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.

Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.

Oxygen.
Oxweld Railroad Service Co., The.

Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.

Packing, Cylinder and Valve Ring.
Hunt-Spiller Mfg. Corp.
Locomotive Finished Material Co.
Westinghouse Air Brake Co.

Jacking, Locomotive.
Johns-Manville Corp.

Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Ring Boiler.
Union Asbestos & Rubber Co.

Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.

Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.

Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing.
Westinghouse Air Brake Co.

Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.

Paint, Metal Protective.
National Lead Co.
Lowe Bros. Co., The
Sherwin-Williams Co.

Paint, Powder.
Aluminum Co. of America.

Paints.
Lehon Co., The.
Lowe Bros. Co., The
National Lead Co.
Sherwin-Williams Co.

Paper, Carbon.
Remington-Rand Business Service

Paper, Sheathing.
Carey & Co., Philip, The.
Lehon Co., The.

Pavement Breakers.
Ingersoll-Rand Co.

Pickling Equipment, Monel Metal.
International Nickel Co., The.

Pile Drivers.
American Hoist & Derrick Co.
Industrial Brownhoist Co.

Piling, Creosoted.
American Creosoting Co.
Century Wood Preserving Co.
International Creosoting & Construction Co.
Jennison-Wright Co.
National Lumber & Creosoting Co.

Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.

Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The

Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.

Pins, Airbrake.
Steel Car Forge Company.

Pins, Center.
Miner, W. H.

Pins, Coupler Knuckle.
McConway & Torley Co.
National Malleable & Steel Castings Co.

Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.

Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.

Pipe Fittings—(See Fittings, Pipe).

Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.

Pipe, Steel Signal.
National Tube Co.

Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.

Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.

Plates.
Steel Car Forge Co.

Plates, Follower.
Steel Car Forge Co.

Plates, Boiler, Firebox—(See Steel Firebox).

Plates, Center—(See Bearings, Center).

Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Interstate Iron & Steel Co.
Ryerson & Son, Joseph T.

Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Interstate Iron & Steel Co.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.

Plates, Tin and Terne.
American Sheet & Tin Plate Co.

Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.

Platforms, Cast Steel, Passenger Car
General Steel Castings Corp.

Plows, Railroad and Grading.
Western Wheeled Scraper Co.

Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Clark Tructractor Co.
Jordan Co., O. F.
Q & C Co., The.

Plugs, Arch Tube.
Prime Mfg. Co., The.

Plugs, Oil & Grease Cup.
Prime Mfg. Co., The.

Plugs, Washout.
Prime Mfg. Co., The.

Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Pneumatic Tools.
Ingersoll-Rand Co.

Poles.
Central Coal & Coke Co.
General Electric Supply Corp.
Graybar Electric Co.

Poles, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Poles, Signal.
General Railway Signal Co.
International Creosoting & Construction Co.
Union Switch & Signal Co.
Whiting Corporation.

Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.

Poles, Zinc Metal Arsenite Treatment.
Curtin-Howe Corp.

Posts, Fence.
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Posts, Fence, Creosoted.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.

Powder, Blasting—(See Explosives).

Powdered Coal Equipment.
Muhlfeld, John E.

ower Transmission Supplies.
Sellers & Co., Inc., Wm.

Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Power Shovels.
American Hoist & Derrick Co.
Northwest Engineering Co.

Power Transmission Supplies.
Sellers & Co., Inc., Wm.
Wrought Iron Co. of America.

Preservatives, Wood.
Century Wood Preserving Co.
Jennison-Wright Co.

Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Presses, Hydraulic.
Birdsboro Steel Foundry & Mach Co.

Presses, Wheel.
Birdsboro Steel Foundry & Mach Co.
Sellers & Co., Inc., Wm.

Pulverizers, Coal — (See Crushers, Coal).

Pullshovels.
American Hoist & Derrick Co.
Whiting Corporation.

Pumping Stations.
Fairbanks-Morse & Co.

Pump Liners, Monel Metal.
International Nickel Co., The.

Pump Rods, Monel Metal.
International Nickel Co., The.

Pump Shafts, Monel Metal.
International Nickel Co., The.

Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pumps & Pumping Machinery.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Punching and Shearing Machines.
Ryerson & Son, Joseph T.

Pushers, Coal.
Standard Stoker Co.

Pyrometers, Superheated Steam.
Superheater Co., The.

Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.

Rail-Bonds.
American Steel & Wire Co.
General Cable Corp.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Rail Braces — (See Braces, Rail).

Rail Cranes.
American Hoist & Derrick Co.

Rail Reclamation Equipment.
Ryerson & Son, Joseph T.

Railroad Shops.
United Engineers & Constructors, Inc.

Rail Splice Plates — (See Joints, Rail).

Railroad Structures — (See Engineers and Contractors; also Building).

Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Hyman-Michaels Co.
Illinois Steel Co.
Inland Steel Co.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.

Rails, Relaying.
Hyman-Michaels Co.

Railway Signals.
General Electric Supply Corp.

Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.

Recorders, Speed & Cut-off.
Valve Pilot Co.

Rectifiers for Signal Work.
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.

Reducing Valves.
Vapor Car Heating Co., Inc.

Reflectors, Headlight.
Sunbeam Electric Mfg. Co.

Refrigerators.
American Radiator Co.
Wine Railway Appliance Co.

Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Ringers, Bell.
Hammett, H. G.

Rivet Cutters.
Ingersoll-Rand Co.
Interstate Iron & Steel Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co.

Rolled Steel.
Carnegie Steel Co.

Roller Bearings (See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Mach. Co.

Roof Decks, Steel.
Mahon Co., R. C.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Lehon Co., The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Tuco Products Corp.
Union Metal Products Co.

Roofing, Corrugated.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
Johns-Manville Corp.

Roofing, Tile.
Federal American Cement Tile Co.

Roofing, Tile, Cement.
Federal American Cement Tile Co.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.
Oakite Products, Inc.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sand Plants.
Railway Engineering Equipment Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Circular Metal.
Ryerson & Son, Joseph T.

Saws, High Speed, Friction.
Ryerson & Son, Joseph T.

Saws, Portable Rail.
Industrial Brownhoist Corp
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag.
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Seats, Car.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Seats, Coach.
Brill Co., The J. G.

Shafting.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Standard Steel Works Co.

Shapers.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Sellers & Co., Inc., Wm.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheds, Train.
American Bridge Co.
Inland Steel Co.

Sheets, Black and Galvanized.
Allegheny Steel Co.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Car & Building.
American Rolling Mill Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.
Ryerson & Son, Joseph T.

Sheets, Corrugated and Plain.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co
Inland Steel Co.

Sheets, Polished or Planished. Iron.
American Rolling Mill Co.
American Sheet & Tin Plate Co.

Sheets, Steel.
American Rolling Mill Co., The.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sherardising Plants.
General Electric Co.

Shop Calling Systems—(See Systems, Communication)

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels & Draglines.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.

Shovels, Gasoline & Electric.
American Hoist & Derrick Co.

Shovels, Steam, Gasoline & Electric.
American Hoist & Derrick Co.
Clark Tructractor Co.
Orton Crane & Shovel Co.

Siding, Bldg., Car, Corrugated & Plain.
Kinnear Mfg. Co.
American Rolling Mill Co.
American Sheet & Tin Plate Co.
Inland Steel Co.

Siding, Corrugated & Plain.
Carey & Co., Philip, The.
Johns-Manville Corp.

Siding, Iron & Steel.
American Rolling Mill Co.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co.

Signal Blades.
General Railway Signal Co.
Union Switch & Signal Co.

Signals, Crossing.
Union Switch & Signal Co.

Signals, Crossing Protection.
General Railway Signal Co.
Railroad Supply Co.

Signals, Railway.
General Electric Co.
Union Switch & Signal Co.

Signs, Highway Crossing.
Railroad Supply Co.

Silico Manganese.
Vanadium Corp. of America

Silicon.
Electro Metallurgical Sales Corp.

Slabs, Concrete Floor.
American Cement Tile Mfg. Co.
Federal Cement Tile Co.

Slag, Blast Furnace.
Carnegie Steel Co.

Slotting Machines.
Sellers & Co., Inc., Wm

Slotting Machines, Locomotive Cylinder.
American Steel & Wire Co.

Sludge Removers.
Bird-Archer Co., The.

Soap, Liquid.
West Disinfecting Co.

Snow Plows.
Jordan Co., O. F.

Solder.
National Bearing Metals Corp.
Westinghouse Elec. & Mfg. Co.

Speed Indicators & Recorders.
Valve Pilot Corp.

Spelter—(See Zinc).

Spikes.
American Steel & Wire Co.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Splice Bars, Angle.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Spreaders, Ballast.
Jordan Co., O. F.

Spring, Plates or Seats.
Allegheny Steel Co.
National Malleable & Steel Castings Co.
Union Spring & Mfg. Co.

Springs.
American Steel Foundries Co.
American Steel & Wire Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Switch & Signal Co.

Springs, Shop Equipment.
Ryerson & Son, Joseph T.

Springs, Vanadium Steel.
Union Spring & Mfg. Co.

Stacks, Steel.
American Bridge Co.
Graver Tank & Mfg. Corp.

Stands, Switch & Target.
Q & C Co., The.

Staybolts.
American Locomotive Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Flannery Bolt Co.
Ryerson & Son, Joseph T.

Staybolts, Hollow.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Steam Chests.
Franklin Railway Supply Co., Inc.

Steam Enclosures, Corrugated Iron.
Republic Steel Corp.

Steam Shovels.
American Hoist & Derrick Co.
Orton Crane & Shovel Co.

Steel Alloy.
Illinois Steel Co.
Ryerson & Son, Joseph T.
Republic Steel Corp.
Standard Steel Works Co.

Steel, Firebox.
Carnegie Steel Co.
Illinois Steel Co.

Steel, Heat Treated.
Interstate Iron & Steel Co.

Steel & Iron, Stainless.
Allegheny Steel Co.

Steel, Open Hearth.
Carnegie Steel Co.
Illinois Steel Co.

Steel Plate Construction.
Graver Tank & Mfg. Corp.

Steel, Pressed Specialties.
Hale-Kilburn Co.

Steel, Structural.
American Bridge Co.
Carnegie Steel Co.
Graver Tank & Mfg. Corp.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Steel, Tool.
Illinois Steel Co.
Midvale Co., The.
Q & C Co., The.
Ryerson & Son, Joseph T.

Step Joints.
Q & C Co., The
Rail Joint Co.

Steps, Car—(See Car Steps, Safety).

Stokers, Locomotive.
Standard Stoker Co.

Stokers, Mechanical.
Westinghouse Elec. & Mfg. Co.

Stoker Repair Parts.
Standard Stoker Co.

Storm Sewers, Corrugated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Strainer, Air.
Westinghouse Air Brake Co.

Strainers, Tank Hose.
Prime Mfg. Co., The.

Stream Enclosures, Corrugated Iron.
Armco Culvert Mfrs. Assoc.

Stringers, Bridge.
Central Coal & Coke Co.
Century Wood Preserving Co.
International Creosoting & Construction Co.

Stringers, Bridge, Creosoted.
Century Wood Preserving Co.
National Lumber & Creosoting Co.

Structural Shapes, Rolled Shapes.
Carnegie Steel Co.

Superheaters.
Superheater Co., The.

Supports, Bottom Rod Safety.
Chicago Railway Equipment Co.

Switch Boards.
Graybar Electric Co.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Switch Machines.
General Railway Signal Co.

Switch Movements.
Union Switch & Signal Co.

Switch Ties.
International Creosoting & Construction Co.

Switch Ties, Creosoted.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Switches, Electric.
Electric Service Supplies Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Switches & Switch Stands.
Ramapo Ajax Corp.

Syphons, Corrugated Iron.
Armco Culvert Mfrs. Association.
Republic Steel Corp.

Syphons, Locomotive.
Locomotive Firebox Co.

Syphons, Locomotive, Boilers
Locomotive Firebox Co.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tamping Machines, Tie.
Ingersoll-Rand Co.

Tamping Outfits, Tie.
Ingersoll-Rand Co.

Tanks, Acetylene, Gas.
Oxweld Railroad Service Co., The.

Tanks, Air, Gas, Oil and Water.
Graver Tank & Mfg. Corp.

Tanks, Water.
American Bridge Co.
American Locomotive Co.
National Tube Co.
Pressed Steel Car Co.
Westinghouse Air Brake Co.

Tape, Insulation.
Johns-Manville Corp.
Okonite Co., The.
Westinghouse Elec. & Mfg. Co.

Taps, Staybolt.
Ryerson & Son, Joseph T.

Tele. & Tele. Wire.
Anaconda Wire & Cable Co.
General Cable Corp.
General Electric Supply Corp.

Terminals, Railroad.
United Engineers & Constructors, Inc.

Testers, Boiler.
Sellers & Co., Inc., Wm.

Testers, Gage.
Ashton Valve Co.

Testers, Rail.
Sperry Products, Inc.

Testers, Staybolt.
Flannery Bolt Co.

Thermostats.
Vapor Car Heating Co., Inc.

Throttles.
American Throttle Co.

Tie Plates.
Bethlehem Steel Co.
Illinois Steel Co.
Railroad Supply Co.

Ties, Creosoted.
International Creosoting & Construction Co.
Jennison-Wright Co.
National Lumber & Creosoting Co.

Ties, Steel.
American Bridge Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Ties, Wood.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Tile, Cement, Concrete.
Federal American Cement Tile Co.

Timber.
Central Coal & Coke Co.
Curtin-Howe Corp.

Tires.
Firestone Tire & Rubber Co.
General Tire & Rubber Co.
Goodyear Tire & Rubber Co.
Goodrich Rubber Co., B. F.

Timber, Creosoted.
Century Wood Preserving Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Tires, Steel.
Edgewater Steel Co.
Midvale Co., The.
Railway Steel Spring Co.
Standard Steel Works Co.

Tools, High Speed Steel.
Bethlehem Steel Co.
Bird-Archer Co., The.

Towers, Floodlight.
Pyle-National Co.

Track Skates.
Q & C Co., The.

Tractors.
Caterpillar Tractor Co.
Elwell-Parker Electric Co.
Industrial Lumber Co.
International Creosoting & Construction Co.
West Coast Lumber Trade Extension Bureau.

Tractors, Industrial.
Clark Tructractor Co.
Elwell-Parker Electric Co.
International Harvester Co.

Tractors, Turntable.
Nichols & Bros., Geo. P.

Trailers.
Clark Tructractor Co.

Train Control Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Tramways, Wire Rope.
American Steel & Wire Co.

Transfer Tables.
American Bridge Co.
Industrial Brownhoist Corp.
Nichols & Bros., Geo. P.
Whiting Corporation.

Transformers.
General Electric Supply Corp.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Trap Doors.
Edwards Co., O. M.

Trap Doors & Fixtures.
Tuco Products Corp.

Traps, Steam.
Johns-Manville Corp.

Treads, Bridge Floor.
Carnegie Steel Co.

Treads, Safety.
Ryerson & Son, Joseph T.

Treatment, Water—(See Water Softening and Purifying).

Truck Frames—(See Frames, Truck).

Trucks, Oxy-Acetylene Supply.
Oxweld Railroad Service Co., The.

Trucks, Car.
St. Louis Car Co.

Trucks, Car and Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bettendorf Company, The.
Birdsboro Steel Foundry & Mach. Co.
Brill Co., The J. G.
Flexible Truck Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co.
Mt. Vernon Car Mfg. Co
Pressed Steel Car Co.
St. Louis Car Co.
Standard Car Truck Co.
Symington Co., The.

Trucks, Cast Steel Tender
General Steel Castings Corp.

Trucks, Cast Steel, Electric Car
General Steel Castings Corp.

Trucks, Cast Steel, Car & Locomotive
General Steel Castings Corp.

Trucks, Dump.
Clark Tructractor Co.

Trucks, Electric Storage Battery.
Elwell-Parker Electric Co.
Whiting Corporation.

Trucks, Industrial.
Elwell-Parker Electric Co.

Trucks, Motor.
Dodge Motor Truck Corp.
General Motors Truck Co.
International Harvester Co.
Reo Motor Car Co.
White Co., The.

Trucks, Shop.
Clark Tructractor Co.

Trucks, Tender.
Flexible Truck Co.

Trucks, Trailer.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.

Tubes, Arch.
National Tube Co.

Tubes, Boiler.
Allegheny Steel Co.
Bethlehem Steel Co.
National Tube Co.
Ryerson & Son, Joseph T.

Tubes, Boiler, Charcoal Iron.
Bethlehem Steel Co.
Reading Iron Co.

Tubes, Staybolt.
Falls Hollow Staybolt Co.

Tubes, Tire.
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.

Tubing.
Aluminum Co. of America.

Tubing, Seamless Steel.
National Tube Co.

Tungsten Metal.
Vanadium Corp. of America.

Turbo Generators.
Electric Service Supplies Co.
General Electric Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Turnbuckles.
American Bridge Co.
American Steel & Wire Co.
Ryerson & Son, Joseph T.

Turntable Tractors.
Nichols & Bros., Geo. P.

Turntables.
American Bridge Co.
Industrial Brownhoist Corp.

Typewriter Ribbons.
Remington-Rand Business Service.

Typewriters.
Remington-Rand Business Service.

Uncoupling Device.
Hutchins Car Rfg. Co.

Undercrossings, Corrugated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Underfloor Duct.
General Electric Supply Corp.

Underfloor Duct, Fibre and Metal.
Johns-Manville Corp.

Underframes, Cast Steel. Tender
General Steel Castings Corp.

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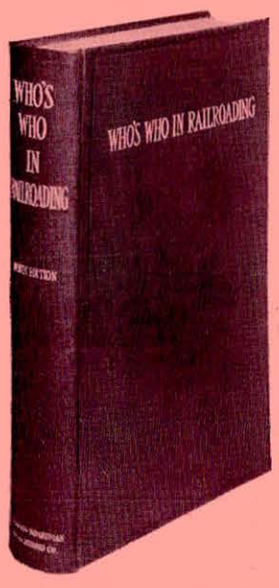

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